CONFLICT BETWEEN INTERGENERATIONAL FAMILY FARMERS AND ENVIRONMENTAL PLANNING PROCESSES:

An "Economic versus Environment" Proposition or Different Ways of Knowing?

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&

All the Intergenerational Family Farmers of Canterbury

Abstract:

Since European settlement, farming has shaped New Zealand economically, socially and environmentally, often in commodity 'boom and bust' cycles with significant environmental impacts. Parliamentary Commissioner for the Environment Dr Jan Wright (2013, p.7) describes New Zealand's current dairy boom as "a classic economic versus the environment dilemma." But this image of farming as an 'economic versus environment' proposition does not accord with my knowledge of non-indigenous intergenerational family farming in Canterbury, New Zealand, nor with the place-attachment relationships of non-indigenous intergenerational family farmers documented in some social science literature. From the early 1970s, Transactive Planning Theory was premised on an understanding that conflict between planners and clients (people-in-place) is the product of different epistemologies or ways of knowing. More recently, Indigenous Planning literature suggests conflict in planning or resource management can reflect deeper ontological schisms between people or differences in worldviews. However, such explanations lead to a second question: if conflict between planners and resource users is grounded in epistemological or more significant ontological differences, how can they be reconciled?

This research explores whether conflict between non-indigenous intergenerational family farmers and environmental planning processes in Canterbury, New Zealand is an 'economic versus environment' proposition or conflict between alternative environmental management systems underpinned by different ways of knowing. Also it explores whether and how such conflict can be recognised and reconciled. There is, of course, an intergenerational attachment to land in Canterbury much older than that of non-indigenous intergenerational family farmers; being that of Ngāi Tahu whānui. This study is not, in any way, an attempt to silence that relationship nor to argue that the research cohort has a place-attachment relationship akin to indigeneity. Rather, it is to explore and articulate non-indigenous intergenerational family farming culture in its own terms, and to explore conflict between that cultural knowledge and environmental planning processes.

Researching within a critical hermeneutic framework using enactive research, oral narratives of the farming life-stories of 52 intergenerational family farmers were created. These oral narratives and a further 30 written narratives are critically analysed to interpret and articulate non-indigenous intergenerational family farming culture and associated environmental management systems. In addition, the experiences of the 52 farming families with environmental planning processes for managing conservation sites on-farm and the effects of farming activities on freshwater in Canterbury are analysed in two case studies. As part of those case studies, participants were asked how they would address those issues if they could 'hold the planner's pen.'

This thesis argues for multiple ways of knowing and practicing farming in Canterbury of which non-indigenous intergenerational family farming is one form, with distinctive characteristics, motivators and ethics. Secondly, it argues that non-indigenous intergenerational family farming knowledge is embedded: it is cultural knowledge of place which is motivated by and adaptive to environmental issues. Thirdly, it argues that conflict between non-indigenous intergenerational family farmers and

environmental planning processes in Canterbury is not usually an ‘economic versus environment’ proposition but is grounded in different ways of knowing farming and environmental management. Those differences are largely epistemological but are becoming irreconcilable because the contemporary environmental planning process in New Zealand is losing awareness of its ideological foundations in Neo-liberalist and Rational Planning Theories. This study argues for reconfiguration of the planning process using a Place-attachment Planning Model with intergenerational people-in-place and their place-specific, experiential knowledge at its core, supported rather than supplanted by Western science and planning paradigms.

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List of Acronyms:

GMP – Good Management Practices

ONL – Outstanding Natural Features and Landscapes

RMA – Resource Management Act 1991

SNA – Significant Natural Areas

TEK – Traditional Environmental Knowledge

CHAPTER ONE Introduction

1.1 Setting the Scene

Since European settlement in the mid-nineteenth century, primary production within British-based farming systems has dominated New Zealand's economy. In 1888, New Zealand Premier Sir Robert Stout declared sheep farming as "the backbone of the nation" (Bardsley, 2009, p.13) and today primary production remains New Zealand's highest income sector, generating a record $46.4 billion in export earnings in the year to June 2019 (New Zealand Government, 2019)[1]. However these economic benefits carry environmental costs. New Zealand's farming history is characterised by a series of "environmentally impoverishing commodity booms" (Pawson, 2018c, p.256): from the 1860s wheat boom and its associated effects on soil fertility (McLauchlan, 1981; Wynn & Cant, 2001); to the dairy boom of the 1920s and the resulting clearance of erosion-prone bush land in the North Island (McLauchlan, 1981); to the 1949 Royal Commission of Inquiry into Sheep-Farming (O'Connor, 1993); to the impacts of New Zealand's current dairy boom[2] on freshwater (Jay, 2004; Wright, 2013, 2015).

Responding to those environmental impacts, scientists, geographers and planners have often interpreted farming as an 'economic versus environment' proposition, with farmers assumed to be unaware or uncaring of the environmental impacts of their farming activities. Geographer and agricultural advisor Lance McCaskill claimed (1937, in Dominy, 2001, p.9) "…early runholders abused the land viewing it solely as an economic commodity with no regard for conservation values." Writing over 70 years later, environmental planner Dr Caroline Miller (2011, p. 81) reiterates that:

> "…farmers saw bush remnants not as part of a biodiversity resource and a haven for native birds but rather as an unproductive area that was left to browsing stock. Wetlands were seen as areas to be drained rather than as a haven for ducks…or as a complex nursery and habitat for a variety of fish, amphibians and birds."

Similarly, New Zealand's Parliamentary Commissioner for the Environment Dr Jan Wright (2013, p.7) described the environmental impacts of New Zealand's current dairy boom as, "…a classic economics versus the environment dilemma."

As a student of geography and as an environmental planner, I am aware of the history of environmental impacts from farming in Canterbury and elsewhere in New Zealand. However, I am also part of a non-indigenous intergenerational farming family and community and, drawing on that background, I struggle with the notion that farming, at least in the form in which I know it, is an "economic versus environment" proposition with farmers unaware of or uncaring about environmental issues. I struggle with this notion for several reasons. While New Zealand's environmental history is shaped by the impact of Māori and

[1] Tourism is sometimes reported as New Zealand's largest economic activity, depending on the statistics measured and whether primary production is counted as one sector or divided into forestry, dairy, red meat, etc. In the year ending 30 March 2018 tourism expenditure in NZ, including domestic and support services, was $39.1 billion (www.mbie.govt.nz/home/immirgationandtourism/tourismandtheeconomy).

[2] Export earnings from dairy products have increased from just over $NZ2 billion in 1990 to $NZ17.2 billion in the year ending March 2018 (www.rbnz.govt.nz) and the national dairy herd has increased from 3 million cows in 1982 to 4.99 million in June 2018 (www.statisticsnz.govt.nz; DairyNZ, 2019).

later British farming practices (Cumberland, 1983; Gladsby, 2000; Pawson, 2002; O'Regan, 2014), it is also shaped by a history of farmers recognising and responding to those environmental impacts as part of their farming practices. For example, it was political lobbying by runholders that resulted in the passing of the Rabbits Nuisance Act 1867 which empowered farmers to establish and fund local boards to manage rabbits and later other introduced pest species (New Zealand Heritage Advisory Board, 1971; Peden & Holland, 2002). Similarly, it was farmers who both funded and sat on Catchment Boards, whose function was to address issues with soil erosion and water management under the Soil Conservation and Rivers Control Act 1941 (Woodhouse, 1982; O'Connor, 1993). While Roche (2002) notes that some farmers initially were wary of the notion of urban-elected representatives on Catchment Boards influencing rural land uses, Newton (1973), Woodhouse (1982) and O'Connor (1993) all describe the programmes as successful with farmers. O'Conner (1983, p.137) commenting:

> "the farm plans developed under those programmes were not confined to erosion treatment measures but plans for good soil management and land husbandry across the farm, including improving pasture and grazing management, shelter, rabbit control and…sensible requests for riparian zones for streams".

The 'economic versus environment' proposition does not explain the actions of farmers who have protected wild ecosystems and conservation sites on their farms for altruistic reasons. For example, Putaruru dairy farmers Gordon and Celia Stephenson were instrumental in establishing the QEII Trust Covenant Programme in 1977 to protect indigenous biodiversity on farms (McCahon, 2017), at a time when the New Zealand Government was still paying subsidies for farmers to convert native bush and wetlands into farm land (Le Heron, 1992). Since then, over 4600 farmers have voluntarily placed QEII Trust Covenants over 189 000 hectares of private land (www.qeiinationaltrust.org.nz) to protect conservation values in perpetuity, without receiving any financial compensation[3]. There are other examples of farmers engaging in voluntary programmes to identify and protect conservation sites on farms in New Zealand, from the Recommended Areas of Protection Programme established by the Department of Lands and Survey in 1982, to the Banks Peninsula Conservation Trust established in 2001. These actions form part of a case study in Chapter Seven.

Finally, an 'economic versus environment' proposition is inconsistent with the writing of non-indigenous intergenerational family farmers in Canterbury and elsewhere in New Zealand: writing which suggests these farmers hold detailed knowledge of and interest in their environment. For example, early runholder George Tripp was renowned for his advice to other runholders to, "only employ Scottish shepherds because they know how to farm the hills" (Burton, 1938; Holland & Hargreaves, 2001). In another example, long before indigenous biodiversity became a popular environmental issue, Roberts (1946) of Happy Valley in the Hurunui District, wrote of his sadness at the loss of native birds and flora, and McRae (1968, p.42) records Ron Anderson of Mt Algidus Station ruing, "the responsibility of our grandfathers for the loss of bird life." Perhaps most well-known of such writings is Herbert Guthrie-Smith's book (1920) *Tutira: The Story of a New Zealand Sheep Station*. That work has received national and international acclaim for its detailed observations and understandings of the local environment. Cronon (1999, p.xi)

[3] QEII Covenants are registered on the Certificate of Title of a freehold estate binding all subsequent land owners. They can only be removed with the agreement of the QEII Trust, and only then if the site no longer holds the values for which it was protected (www.qeiinationaltrust.org.nz). In 33 years, no covenants have been revoked.

describes the book as, “one of the great English-language classics of environmental history….” More pertinent to this research is Guthrie-Smith’s (1940, reprinted in 1999, p.xxiii) own reflection of his life farming Tutira:

> ”…am I absolutely happy on another scope - my substitution of domestic breeds of animals for native lizards and birds; quickly melting New Zealand through erosion into the Pacific - a question of ethics this… Have I then for sixty years desecrated God’s earth and dubbed it improvement?”

Finally, farming as an ‘economic versus the environment’ proposition is inconsistent with the findings of social science researchers who have investigated aspects of the farmer-environment relationship or family farming culture in New Zealand. For example, Holland (2013) researched historic farm diaries, letters and other archives relating to colonial Southland farmers and concluded that these settlers may have been more aware of their local environment and adapting in their farming practices than is presumed in academic literature. Similarly, Peden (2011), investigating the diaries of early South Canterbury runholders, concluded that agri-science literature in New Zealand may have over-estimated the extent to which early runholders burned and over-grazed their runs. Hatch (1992), Morris et al (1995), Jay (1991) and Stock and Peoples (2012) have all explored differences in farming systems and culture between farmers, particularly dairy and sheep, using ethnographic research frameworks; while Dominy (1990, 1995, 2001) and Morris (2002) both studied aspects of the culture of high country farming families in the South Island of New Zealand. Hatch (1992), Dominy (2001) and Morris (2002) all observed farming families as culturally ‘embedded’ in landscapes, their perceptions of self and farming strongly tied to landscape or what Hatch (1992, p.6) described as ‘bounded communities’ which reflect the topographic characteristics of their region. Dominy (2001, p.3), somewhat controversially, described this relationship between non-indigenous intergenerational farming families and place as an ‘Anglo-Celtic settler descendant indigeneity’. (The ‘controversy’ surrounding Dominy’s research is discussed in Chapter Two.) More recently, Pawson (2018a) wrote of the relationship between landscape and provenance in the rural area of Banks Peninsula. Pawson’s (2018a) work forms part of a body of research into agri-food geographies from the Biological Economies Team, research which advocates for a more holistic look at the socio-cultural and socio-economic aspects of rural land use in New Zealand then a narrow understanding of farming as commodity production (Campbell et al, 2009, Lewis et al 2013, Le Heron et al, 2016; Pawson et al, 2018).

Similarly, potential causes of conflict between planning processes and people-in-place, including farmers, have been documented in social science research since the early 1970s. Friedmann’s (1973) Transactive Planning Theory, which underlies contemporary Communicative Planning Theory, is premised on the notion that conflict between planners and clients (or people-in-place) is a product of different ways of knowing. Similarly, researchers in radical planning, indigenous planning and critical policy analysis, for example Herde (1999), Goldblatt (2001), Howitt (2001), Porter (2004) and Menzies and Butler (2006), argue that conflict in planning or environmental management may be the result of differences in ontology or worldviews. Howitt (2001, p.59) suggests:

> “Competing land uses and conflicting resource management systems are not simply reflections of competing vested interests, nor competing views of the utility of ‘country’ for society. In many cases,

these conflicts reflect much deeper ontological schisms between world views – between ways of seeing the world and ways of thinking about peoples' places within the world."

Duncan (2016) notes that within environmental policy and resource management literature generally, contested environmental management is recognised as a product of divergent but equally valid problem framings and ways of knowing between resource users and policy-makers. However, that literature tends to assume those differences can be overcome through epistemological integration and co-production of knowledge. She asks a question:

"what if the ways of knowing between policymakers and resource users have become (or are becoming) so divergent they are incompatible" (Duncan,2016, p.156)?

This research explores whether conflict between non-indigenous intergenerational family farmers and environmental planning processes in Canterbury, New Zealand is an 'economic versus environment' proposition or an 'environment versus environment' proposition underpinned by different ways of knowing? Also, it attempts to answer Duncan's (2016) question about how such conflict can be reconciled in environmental planning processes, if ways of knowing between planners and resource users are becoming incompatible? The research sits at the intersection of several disciplines. It contributes to theories of planning practice but through the study of farmer-environment relationships and place-attachment culture makes a contribution to human geography, rural sociology, agri-science and, arguably literature on TEK. To ground this research in context, Section 1.2 describes the contemporary environmental planning process in Canterbury New Zealand and its ideological foundations. Section 1.3 outlines my background in both environmental policy and planning and intergenerational family farming. It explains how working in these fields over the last 25 years has led me to question the 'economic versus environment' proposition as a universalising explanation for conflict between farmers and environmental planning processes, and why I began to consider the possibility that, in some cases, such conflict may result from different ways of knowing. Section 1.4 formalises the research questions, describes the basic research approach, and outlines the content of this thesis.

1.2 New Zealand's Environmental Planning Process

Terms such as 'environmental policy process' and 'environmental planning' are used frequently and interchangeably in literature but are not always defined. Hall (1992, p.3) describes planning as "the making of an orderly sequence of action that will lead to the achievement of a goal or goals" and the planning process as the way planning is undertaken. However, in New Zealand the term 'environmental policy' is often used as a synonym for 'environmental planning' and Memon (1993) describes environmental policy as: "government action to solve the problems of society's relationship with its environment". He cites Park's (1986 in Memon, 1993, p.3) description of policy-making as a normative process to define the approved parameters of what is acceptable in terms of resource exploitation and environmental quality, and O'Riordan's observation (1982, in Memon, 1993, p.14) that the policy process is usually supported by an enabling statute and budget. For the purposes of this research, the term 'environmental planning process' describes government action to manage society's relationship with its environment using an enabling statutory framework and normative planning process to define acceptable and unacceptable actions in both resource use and environmental quality. Borrowing from Sharp and Richardson (2010), my definition encompasses the entire planning process, including ideology, strategy,

language and practice. The term ‘environmental management’ describes processes of people managing and responding to environmental conditions outside the formal statutory planning process.

From colonial settlement until the late 1980s, New Zealand’s environmental planning process mirrored that of the United Kingdom and to a lesser extent the USA (Memon, 1993; Miller, 2011). However, in the late 1980s, a process of state sector restructuring gave it a unique twist. In 1984, the Fourth Labour Government (1984-1990) embarked on a process of political, social and economic reform known as state sector restructuring (Britton et al, 1992; Memon & Perkins, 2000). State sector restructuring was driven by socio-economic and socio-political ideologies which have been labelled in relevant literature as Neo-liberalism and New Environmentalism (Memon, 1993; Memon & Gleeson, 1995; Jay, 1999; Perkins & Thorns, 2000). Beaten (2017) describes Neo-liberalism as a form of governance underpinned by a belief in the superiority of the market to allocate land in the most efficient way, a distrust in state planning which is agreed to distort the market, the introduction of private sector principals into planning processes, and reinforcing the role of the state to fulfil repressive functions that private actors cannot achieve. Within New Zealand, Neo-liberalism influenced the planning process in three key ways: firstly, the notion that resources are most efficiently allocated and used by market forces; secondly, that the use or development and the protection of resources are separate, potentially conflicting goals; and thirdly, that the policy, regulatory and service delivery functions of government ought to be separate (Palmer 1990; Britton et al, 1992; Jay 1999; Bührs, 2000; Miller, 2011, 2017). The resource use or development functions of central and local government were separated from their environmental protection functions and the former privatised. Within the arms of central or local government that remained, policy, regulatory and service delivery functions were separated (Britton et al, 1992; Le Heron & Pawson, 1996; Memon & Perkins, 2000).

Neo-liberalism was an emergent trend in Western democracies during the 1980s (Beaten, 2017) and in that context planning in New Zealand arguably still mirrored the United Kingdom. However as part of that process New Zealand’s statutory environmental planning framework was overhauled in a process called resource management law reform, which gave planning in New Zealand its distinct character. Some 54 statues and over 20 regulations were repealed (Palmer, 1990, p.94) and replaced with a single statute, the Resource Management Act 1991 (RMA) with a single purpose: “to promote the sustainable management of natural and physical resources” (RMA, s5). Sustainable management was a unique concept. It was derived from the international concept of sustainable development coined in the Brundtland Report (1987), which recognises the interconnectivity of economic, social and environmental systems, but massaged to fit the neo-liberalist underpinnings of New Zealand’s state sector restructuring process. This ‘massage’ was achieved by placing the focus of environmental planning on managing resource protection and the environmental effects of resource use or development, but using ‘market forces’ to drive resource use and development (Memon & Perkins, 1993; Weastell, 1994; Le Heron & Pawson, 1996; Bürhs, 2000). Post resource management law reform, the environmental planning processes that interact most with farming in New Zealand are those under the RMA and the Biosecurity Act 1993. Under those Acts local authorities (regional and district councils) are required to develop policies and rules to manage various environmental issues, though the Crown (through government ministers) may create national policy or regulation as well.

The emphasis in the state sector restructuring process on models of economic efficiency and bureaucratic transparency leant itself to Rational Planning Theory and a Rational-comprehensive Planning Model. The Rational-comprehensive Planning Model is a 'top-down approach' to planning and decision-making which emulates Western scientific approaches to problem-solving and knowledge validation (Sandercock, 1998; Lawrence, 2000, Innes & Booher, 2015). Planners are assumed to be 'value-free' experts, identifying and evaluating technical information to inform their decisions or recommendations. Legally enforceable rules or regulations are assumed to offer the best environmental outcomes or the greatest level of environmental protection (Memon 1993; Miller, 2017). While public participation was not part of the original Rational-comprehensive Planning Model, it became an integral part of environmental planning in New Zealand. Bührs (2000) suggests public participation is assumed to result in a planning process with a higher degree of environmental scrutiny. This notion of value-free, technical decision-making subject to public scrutiny is reinforced through a combination of professional planning ethics and quasi-judicial, public decision-making processes (Ministry of Justice, 2014; Miller, 2017). The Rational-comprehensive Planning Model has been challenged in international planning literature since the late 1950s and Rational Planning Theory since the early 1970s, yet both persist in practice. Innes and Booher (2015, p.197) argue both concepts persist in public policy-making and planning practice because they provide a level of certainty and transparency in process and decision-making, and have "…become deeply integrated into planning education [and] entwined with the norms of bureaucracy."

The process of state sector restructuring and resource management law reform changed the relationship between farmers and environmental planning processes in New Zealand. The RMA subjugated more farming to the environmental planning processes than previously, and the nature of the environmental planning process changed. Under both the Town and Country Planning Acts 1953 and 1977 rural land was valued for food production (O'Connor, 1993, p.139; Town and Country Planning Act 1977, s.3) and the major focus of both statutes was to control urban development in rural areas. Other environmental issues such as loss of indigenous biodiversity were not yet on the political radar. The Soil and Water Conservation Act 1967 did control the abstraction of water, but those provisions only affected the few farmers wanting to irrigate: the effects of the current 'dairy boom' on freshwater in Canterbury were 25 years away. In contrast, under the RMA, there is no explicit duty to maintain rural land for food production (RMA, s5(2)) and the 'Matters of National Importance' in section 6 of the Act focus on protecting aspects of the environment typically found in rural areas, for example: natural character of lakes and rivers (s6(a)); outstanding natural features and landscapes (s6(b)); and significant areas of indigenous vegetation and habitats of indigenous fauna (s6(c)). Suddenly, in the 1990s, farmers in Canterbury (and elsewhere) were facing rules restricting activities such as clearing indigenous vegetation, draining wetlands, tree-planting, and earthworks – activities which, until 1984, they had received fiscal incentives to do. From 2011, a second wave of policies and rules has emerged to address effects of dairy farming on freshwater including rules restricting the ability of all farmers to intensify and change land uses (Ministry for the Environment 2011, 2014; Canterbury Regional Council, 2012, 2016).

Prior to the RMA, the only interaction most farmers had with environmental planning was through working with Pest and Catchment Boards to manage pest incursions and soil erosion on-farm. Those Boards used planning approaches based on Transactive Planning Theory; that is farmers and soil scientists or ecologists worked together to identify and manage soil erosion or pest issues specific to each farm.

However under the RMA, the emphasis on using a Rational-comprehensive Planning Model meant the status of farmers as local landholders and resource users, and their local environmental knowledge, counted for little. Planners and scientists became the technical 'experts' in environmental management and agri-science became the source of technical information about farming. Following neo-liberal principles, the policy and regulatory functions of local government were separated from one another and from service delivery (Le Heron & Pawson, 1996; Memon & Perkins, 2000). The previous partnership between farmers and Pest or Catchment Board staff on-farm was replaced with a bureaucracy of office-based planners or policy advisors relying on agri-science and other scientific information to develop rules or regulations for farming activities, which are enforced by compliance officers from another department; all of which is disconnected from farmers and local environments.

Finally, the notion that resource use and resource protection are separate, potentially conflicting goals has significantly changed the relationship between policy-makers and resource users in environmental planning processes in New Zealand. It couches resource management as an 'economic versus environment' proposition with resource users assumed to be 'pro-economic' and unmotivated towards environmental protection. Therefore resource users must conflict with planners whose role is to curb the excesses of resource use or development in favour of environmental or resource protection. I argue this assumption about the relationship between economic and environmental objectives creates potentially adversarial environmental planning processes and sub-optimal outcomes because one objective (economic or environmental) must be compromised for the other. Also, I argue it creates an environmental planning process unable to recognise environmental management systems which are not underpinned by the same understanding of human-environment and economic-environment relationships. This ideological limitation in the environmental planning process is significant because New Zealand Māori do not understand the world as separate and potentially conflicting economic and environmental systems (Orbell, 1996; Tau et al, 1990; Mihinui, 2002; Jolly, 2013). Yet both the RMA and the Conservation Act 1987 contain statutory duties to recognise and provide for Māori culture and associated environmental management systems either explicitly, for example under s6(e) and s7(a) of the RMA, or through recognition of the principles of the Treaty of Waitangi (RMA, s4; Conservation Act 1987, s3). This challenge to recognising and providing for matauranga and tikanga (Māori knowledge and practices) in environmental planning processes has been identifed in some Indigenous Planning literature which will be discussed in Chapter Two (for example Roberts et al 1995, Matunga, 2000; Roberts, 2002; Panelli & Tipa, 2007; Thompson-Fawcett et al 2017a).

1.3 Emergence of a Thesis Topic

To illustrate how this research topic has emerged and my positionality, this section discusses my work at the interface between non-indigenous intergenerational family farming and environmental planning processes and the influence of Te Ao Tahu in my thinking. To retrace my steps, I completed a Master of Arts degree in Geography at Canterbury University in 1994 and started a career as an environmental planner in the post-state sector restructuring era described in Section 1.2. I spent the first 10 years of my career working largely for district councils who manage effects of land uses on the environment under the RMA, including the duty to recognise and protect outstanding landscapes and natural features (ONLs) and significant areas of indigenous vegetation (SNAs), under sections 6(b) and (c) of the RMA. It was through observing this environmental planning process that I became aware of conflict between

environmental planners and farmers. Most district councils, including Selwyn District Council where I worked (1995-2003), hired landscape architects and ecologists to identify ONLs and SNAs using maps, aerial photographs and existing data. The areas were marked on planning maps with accompanying rules to manage activities that may affect the sites. This approach drew heavy criticism from farmers around New Zealand. Selwyn District Council (1997) and the Far North District Council (1998) both withdrew their plans due to farmer protests, and Ashburton District Planner at the time (Mike Singleton: pers. comm.) told me that, "…in 30 years of local government, I have never seen anything pit councils against their ratepayers in this way." Farmers in the Hurunui District established the Hurunui Significant Natural Area (SNA) Group to challenge the SNA process in the Environment Court. That group continues to oppose the identification and listing of ONLs and SNAs in district plans today (Jamie McFadden: pers. comm).

A logical deduction would be that farmers objected to these rules because they wanted to be able to clear and develop SNAs for farming. However, many farmers protesting against SNAs have QEII covenants protecting ecological sites on their farms, and a founding member of the Hurunui SNA Group, Mr Jamie McFadden, owns an indigenous plant nursery and ecological restoration business. When I discussed the issue with family farmers in Selwyn and Hurunui Districts, they identified a variety of reasons for their opposition to SNAs: from the absence of consultation and the inaccuracy of the mapping, to what they perceived as the 'attitude' of the council staff towards farmers and their conservation efforts. One issue that resonated repeatedly was that councils had used data obtained from the Recommend Areas for Protection Programme noted in Section 1.1, without landholders' agreement. Therefore, at the time, I concluded the reason for the conflict was due to insufficient consultation with farmers and planners being unaware of the conservation work some farmers do on-farm.

In October 2008, I joined the Canterbury Regional Council (Environment Canterbury) as a Planning Manager; a time when concerns about the effects of dairy farming on freshwater were becoming widespread in Canterbury. Regional councils have the function of managing effects of land uses on freshwater under the RMA (s30) and I became involved in that process. I thought the freshwater planning process may prove less confrontational than the district planning process for SNAs and ONLs described above, because Environment Canterbury was engaging agri-scientists and consulting with the Canterbury Primary Sector Group[4] as part of the environmental planning process. Therefore I assumed information on farming and farmer-environment relationships would be fed into the environmental planning process by these parties, though I noted there was no proposal by the Council planning staff to engage directly with farmers. When I asked about this I was told, "we will convince the agri-scientists and they will convince the farmers."

My observations of the land and water planning process in Canterbury revealed that not only was there a difference in understanding of farming and farmer-environment relationships between Council planners and some farmers in Canterbury, but different understandings of farming between some farmers and agri-

[4] Canterbury Primary Sector Group refers to a collective of organisations that work in primary production in Canterbury. It includes grower levy bodies such as Dairy NZ, Beef and Lamb NZ, and Horticulture NZ, representatives from Crown Research Institutions such as Landcare Research, irrigation companies, milk and meat companies, and member funded organisations such as Federated Farmers of NZ and Irrigation NZ.

scientists and policy advisors involved with the Canterbury Primary Sector Group. For example, in the hearing on Plan Change 5 to the proposed Canterbury Land and Water Regional Plan (2012) I witnessed one of the Hearing Commissioners, who had a background in water quality science, ask whether it is true that "most farmers do not know their soil types?" I was surprised when the policy advisor for an irrigation company confirmed that was her experience. The farmers I know, not only know their soil types on farm, they know how they vary inch by inch across their land. In another example, some policy advisors in the Canterbury Primary Sector Group argued that substantial gains could be made in freshwater management by getting farmers to adopt a series of Good Management Practices (GMPs) on-farm. The GMPs they were proposing seemed to me quite elementary land husbandry techniques and, based on my knowledge of family farmers in Canterbury, I questioned whether most farmers would not already be employing them? However the policy advisors on the Canterbury Primary Sector Group assured me that many farmers do not use these GMPs. It occurred to me that these policy advisors may be working with farmers who farm differently from the family farmers I know, and that there may be multiple ways of farming in Canterbury and multiple farming knowledges? The agri-scientists and policy advisors involved in the freshwater planning process did not appear to recognise the wealth of farming and environmental knowledge held by non-indigenous intergenerational family farmers. Rather, they type-casted this cohort of farmers as 'farming in accordance with Grandad's diary' with the implication that they are poorer performers than larger-scale corporate farmers who invest more heavily in agri-science advice and technology. This observation left me wondering where the notion of 'farming in accordance with Grandad's dairy' comes from and why that form of knowledge is dismissed?

In 2012, I took a position as Team Leader Environmental Policy and Planning with Te Rūnanga o Ngāi Tahu.[5] It was in this role that I began thinking about conflict in environmental management as friction between environmental management systems underpinned by different ways of knowing. Despite mana whenua having resources and opportunities to be involved in environmental planning processes with both regional and district councils in the South Island, incorporating matauranga Tahu and tikanga Tahu (Ngāi Tahu knowledge and practices) into these processes was challenging. Council planners wanted to provide for matauranga and tikanga using Western planning tools and approaches, for example, recognising and protecting wahi tapu me wahi taonga (sacred and significant sites) by mapping and listing them in district plans alongside European heritage sites. This approach fitted with the planning framework and their understanding of how to 'protect' sites, but in tikanga Tahu wahi tapu are not disclosed (Jolly, 2013). Secondly, fundamental environmental management concepts such as ki uta ki tai - integrated management from mountains to sea (Jolly, 2013) and kaitiakitanga - the inherited environmental management obligations of mana whenua to care for the environment (Jolly, 2013; Waka Home, 2016), do not fit easily within the RMA. For example, the RMA separates the environment into component parts such as land, beds of lakes and rivers, air, coastal water and freshwater. Management of each 'resource' is subject to separate provisions in the Act (ss9-15) and split between regional and district councils. Similarly, within Te Ao Tahu (Ngāi Tahu worldview) and other Māori worldviews, the duty of kaitiakitanga cannot be separated from rangatiratanga (Tau et al, 1992; Matunga, 2000; Mihinui, 2002). Section7(a) of the RMA requires councils to have regard to kaitiakitanga, but the Act does not deal with rangatiratanga or ownership of resources.

[5] Te Rūnanga o Ngāi Tahu is the iwi authority which represents tangata whenua (the indigenous people) of Ngāi Tahu, Ngāti Mamoe and Waitaha descent in the South Island of New Zealand as set out in Te Rūnanga o Ngāi Tahu Act 1996.

I have observed Ngāi Tahu mana whenua express similar frustrations with the environmental planning process to those I have heard from non-indigenous intergenerational family farmers. For example, when discussing the environmental planning process for freshwater in the Hekeao/Hinds Catchment in mid-Canterbury, kaiwhakahere (Chairperson) of Te Rūnanga o Ngāi Tahu Tā Mark Solomon asked me,

> "why do planners always want to put us in the 'eco-warrior' tent? We are not 'eco-warriors', we use resources, but we do so to a code of environmental ethics?"

This frustration is an example of the 'economic versus environment' assumption underpinning environmental planning processes discussed in Section 1.2, and the consequent categorising of people as either 'pro-economic' or 'pro-environment'. In another example, at a hui (meeting) in 2015 to discuss the provisions for papakāinga/kāinga nohoanga[6] on Te Pātaka o Rakaihautu/Banks Peninsula in the proposed Replacement Christchurch District Plan, Mr Peter Ramsden, Kaitiaki for Te Rūnanga o Koukourarāta said, "Are you telling me, some planner at the council is going to tell us what we can and can't do on our land?" Again, this question reflects ontological differences between Ngāi Tahu culture where rangatiratanga and kaitiakitanga are intertwined and Western legal and environmental planning paradigms where responsibility for environmental management is separated from land ownership or resource use. We had a laugh as I said, "ooh I thought I was in a Federated Farmers' meeting for a minute." I am not suggesting non-indigenous intergenerational family farmers share ways of knowing with mana whenua. Rather, observing parallels with how the environmental planning process seems to jar against rather than embrace the environmental knowledge and practices of both groups, started my thinking about this conflict as the result of different ways of knowing.

Finally, it was my involvement on the Executive of the North Canterbury Province of Federated Farmers of New Zealand Inc (Federated Farmers), including four years as Provincial President and a delegate to the National Council of Federated Farmers, that resulted in this research. The many candid conversations I had with farmers on environmental issues in Canterbury and elsewhere in New Zealand, convinced me that there may be a non-indigenous intergenerational family farming culture which encompasses ways of knowing and doing farming and environmental management which differs from those assumed in agri-science and environmental planning processes. However that knowledge is not well-articulated and farmers who do not farm in accordance with that culture are not criticized, publicly. For example, I was attending a meeting of the Waipara Catchment Committee in North Canterbury as part of a freshwater planning process. During a tea break, a group of farmers discussed the actions of another farmer grazing a large mob of dairy cows beside a local stream. The farmers talked in unfinished sentences and mutters, not explicitly saying why the grazing was inappropriate, yet they appeared to have a shared understanding that it was. When a council staff member joined the group, they stopped talking. It appeared that while the farmers did not approve of their colleague's farm practices, they were not prepared to discuss the matter outside of their 'inner group.' In another example, I attended a conference at Lincoln University on hill country farming in November 2013. When the presenter suggested farmers could increase production on hill country by replacing tussock cover with ryegrass and clover, there was an audible mutter of disapproval around the room. No one questioned the presenter, but at lunchtime the farmers discussed among themselves the value of retaining tussock cover on hill blocks to prevent soil erosion, provide shelter for newborn lambs, and to create microclimates in drought and snow.

[6] Papakainga/kāinga nohoanga is the term Ngāi Tahu mana whenua used to describe developing settlements in accordance with Ngāi Tahu customs as part of the Replacement Christchurch City District Plan process (Murchison, 2017)

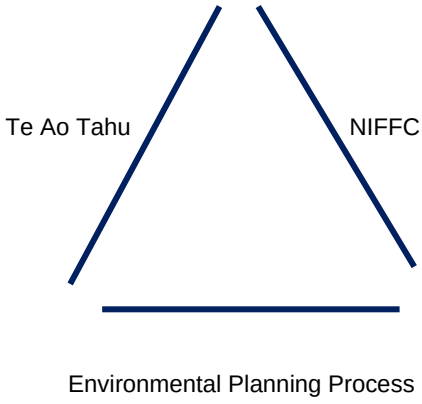
A controversial environmental issue in South Canterbury has been increased use of irrigation in the Mackenzie Basin, spearheaded by a proposal from Dunedin businessman Murray Valentine to establish a large-scale dairy farm at Simons Pass (Williams, 2019). At the Federated Farmers' High Country Conference in Hanmer Springs in May 2017, a non-indigenous intergenerational family farmer told me, "the Mackenzie Basin is no place for dairy cows" while another told me, "the only issue in the high country is businessmen with too much money and not enough brains." Why the Mackenzie Basin is 'no place for dairy cows' and why businessmen should keep their cheque books out of the high country was not elaborated upon; it is unspoken knowledge. I asked a local intergenerational family farmer and friend about his environmental management. Dan said,

> "I don't go out every day consciously thinking about impacts on the environment, but there's some stuff you just don't do" (Dan Hodgen: pers. comm).

He did not elaborate on what those things are 'you just don't do,' but I know what he means and he knows I know what he means. It occurred to me that there may be some value to non-indigenous intergenerational family farmers and environmental planning processes, if 'what we mean' as non-indigenous intergenerational family farmers could be identified, articulated, and recognised within formal academic research protocols. Articulating and naming non-indigenous intergenerational family farming culture enables an examination of both its epistemological and ontological characteristics. This examination is a first step in answering the question: is conflict between non-indigenous intergenerational family farmers and the environmental planning process an 'economic versus environment' proposition or an 'environment versus environment' proposition underpinned by different ways of knowing?

1.4 Research Questions and Thesis Structure

Figure 1: Triangle of Environmental Management in Canterbury



"Figure 1 illustrates the three main threads or influences in my understanding of environmental management in Canterbury, as described in Section 1.3 above. My aim is to explore the relationship between these threads; to metaphorically 'fill the gaps in the triangle.' This thesis is a foundational step in that exploration. It attempts to identify and articulate non-indigenous intergenerational family farming culture (NIFFC) and causes of conflict with environmental planning processes using a research framework that is validated within academic scholarship and literature; to name the unnamed and, by doing so, reshape both understanding and policy engagement. To do that, the research answers two questions:

(1) Is conflict between non-indigenous intergenerational family farmers and environmental planning processes in Canterbury, New Zealand an 'economic versus environment' proposition or conflict between alternative environmental management systems underpinned by differing ways of knowing?

(2) How can alternative environmental management systems underpinned by different ways of knowing be recognised and reconciled in environmental planning processes?

To answer those questions, the first task is to identify and articulate non-indigenous intergenerational family farming culture and associated environmental management systems in Canterbury, New Zealand: to name the un-named. The second task is to evaluate whether and to what extent that culture and associated environmental management system is a different way of knowing from the environmental planning process, to reshape understanding. The third task is to critically analyse the environmental planning process and its underlying power structures, to identify the changes required to reconcile the conflict and improve environmental outcomes, to reshape policy engagement.

The term 'environmental planning process' is defined in Section 1.2 above. The term 'non-indigenous intergenerational family farmer' is not widely used or defined in agri-science or social science literature but is a term I have used to describe my research participants and a cohort of New Zealand farmers, generally. Most social science literature on 'farmers' identifies participants by location or the type of farming they do (dairy, arable, sheep and beef) rather than their longevity in place. Dominy (2001, pp.2-3) describes her research participants as 'Anglo-Celtic settler-descendants' whose farms are passed down through generations by inheritance or subdivision, and includes parents, spouses and children within a family unit. In Dominy's (2001) case study, participants have held their land since the 1930s, but have not always resided on-farm. For the purposes of this research, I have described 'non-indigenous intergenerational family farmers' as farmers who have grown up on a family farm, acquiring their knowledge and skills about farming and their local environment from both their own experiences and knowledge passed down from previous generations. Many participant families have been on the same farm for over 100 years, though some have moved from the original family farm to a new farm at some point. However, in each case, the family has been farming for at least three generations, the participants farm their land themselves, and farming is a full-time occupation for at least one member of the family.

Participant families may have Anglo-Celtic, Anglo-Māori or other ancestry, but the farming systems they are engaged with are founded on British systems of land tenure and land husbandry, using pasture species, livestock and crops introduced into New Zealand by British missionaries or settlers. Therefore, I have described the participants' farming culture as 'non-indigenous'. I have confined my research to non-indigenous intergenerational family farmers because it is within this group of farmers that I have observed conflict with environmental planning processes that is not readily explained as an 'economic versus environment' proposition. I have confined my study area to Canterbury, New Zealand because it is within this area that I have made most of my observations of conflict between non-indigenous intergenerational family farmers and environmental planning processes. That is not to say that other farmers do not have conflict with environmental planning processes, or that similar issues between non-indigenous

intergenerational family farmers and environmental planning processes do not occur in other parts of New Zealand or internationally.

As discussed in Section 1.2, conflict in resource management as the product of divergent problem framings is recognised within the literature on environmental planning and resource management. However, as Duncan (2016) observes, most of that literature suggests epistemological integration and co-production of knowledge as the means to manage conflict. The literature assumes that communities in Western democracies share ontological singularity, which enables different ways of knowing to be recognised, understood and respected by all actors in environmental planning processes. However Duncan (2016) argues for evidence of divergent and potentially incompatible ways of knowing between non-indigenous farmers and environmental planners in her study of collaborative planning processes to manage freshwater in Canterbury. At face value, I would suggest Indigenous Planning scholars may question whether Western planners and Western farmers do not share ontological singularity and suggest that their differences are epistemological and ought to be reconcilable; but Duncan (2016) has concluded that, in her research, that is not the case.

While this issue of irreconcilable ways of knowing has not been well-canvassed within conventional modernist and post-modernist planning theories, it is canvassed within the literature on Indigenous Planning and Traditional Environmental Knowledge (TEK). Berkes (2012, p.7) defines TEK as:

> "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment."

There is no one agreed definition of TEK in academic literature and no one agreed term to describe the phenomena, but the literature is grounded in cultural knowledge of human-environment relationships acquired from living in and observing nature in place, knowledge which is passed down intergenerationally in stories, customs and practices. It is often posited in the literature as an alternative knowledge and environmental management system from Western science and planning paradigms (Butler & Menzies, 2006; Whyte, 2013), though again there are differing views as to whether TEK is a concept knowable outside of cultural context. TEK literature is largely associated with indigenous communities, though some academics (Johnson, 1992; Berkes, 1999; Bocco & Winklerprins, 2016) suggest TEK may be found among non-indigenous communities who live and work in nature, for example fishers and farmers.

I am not suggesting that non-indigenous intergenerational family farming culture in Canterbury is akin to indigenous TEK. Such a proposition is a thesis in itself, assuming TEK can exist as a measurable concept able to be identifed and verified outside of cultural context. Alternatively, if one accepts that TEK is cultural knowledge that can only be understood in ontological context (Smith, 1999; MacGregor, 2004), the argument becomes somewhat circular. Rather, to answer the research questions, this thesis needs to establish whether the participants share a culture underpinned by ways of knowing and doing farming and environmental management which differ from those underpinning statutory environmental planning processes in New Zealand, and to identify the extent to which those differences are reconcilable. TEK

literature has well-established concepts, frameworks and protocols for researching culture and environmental management systems among farming communities who have different ways of knowing from Western science and planning paradigms. The literature draws attention to universalizing assumptions underpinning Western environmental planning and science literature at a level not found in Western planning theory, for example, challenging assumptions that human-environment relationships are a subject-object dichotomy (MacGregor, 2004; Berkes, 2012, 2018) or the existence of knowledge as a phenomenon separate from way of life (Nadasady, 1999). Therefore, I propose to borrow concepts and methodologies used in TEK research to identify and articulate the participants' farming culture and to assess the extent to which it is epistemologically or ontologically divergent from Western science and planning paradigms.

Chapter Two develops the research arguments. It is in two parts: Part One places the research into theoretical context both within social science research generally, and within the literature on planning theory and critical policy analysis. Part Two places the research into a New Zealand context, examining the literature on environmental planning processes and farmer-environment relationships. Chapter Three describes and justifies the use of a hermeneutic research framework, enactive research approach and narrative analysis as an appropriate methodology for undertaking this research. Chapters Four to Six address the first research task. They interpret and analyse the participants' narratives to identify and articulate the existence of a shared farming culture and associated environmental management system. The chapters explore three themes: the participants' understanding of farm as place (Chapter Four); the participants' understanding of farming as an activity, including the role of economic and environmental values (Chapter Five); and the acquisition and transfer of farming knowledge (Chapter Six). The analysis also reflects on the extent to which these environmental management systems represent different ways of knowing and doing farming and environmental management from statutory environmental planning processes.

Chapters Seven and Eight address the two research questions directly. Chapter Seven presents two case studies of conflict between the participants and environmental planning processes in Canterbury, which have been catalysts for this research: the protection of conservation sites (ONLs and SNAs) on farm; and the management of the effects of farming on freshwater. The case studies investigate the nature and extent to which these conflicts are based on different ways of knowing between the participants' environmental management systems and statutory environmental planning processes. Chapter Eight draws together the findings from Chapters Four to Seven and explores whether and how conflict between the participants and environmental planning processes can be reconciled. The chapter attempts a Foucauldian-inspired Discourse Analysis of the environmental planning processes described in the case studies, to argue that these different ways of knowing cannot be reconciled without a critical review of the environmental planning process and the power structures underpinning it. The chapter argues for a new planning approached based on place-attachment relationships, that places intergenerational people-in-place and their place-specific knowledge at its core. Conclusions and reflections on both the research topic and research process, and recommendations for further research, are discussed in Chapter Nine.

CHAPTER TWO The Argument in Context

2.1 Introduction

This chapter places my research within theoretical and literary context. There is no neat body of literature on conflict between non-indigenous intergenerational family farmers and environmental planning processes upon which this research can draw and build. Rather the topic sits at the intersection of literature from several disciplines: planning theory and critical policy analysis; indigenous planning and TEK; agri-science to the extent it traverses farming-environment interactions in New Zealand; and human geography, rural sociology and other social sciences which explore farmer-environment relationships in New Zealand and elsewhere. Each of these categories encompasses a substantial amount of literature and it is impossible within the confines of this thesis to provide a comprehensive review of all the literature in each category. Rather, I have focused on literature which, as the chapter title suggests, provides theoretical and contextual grounding for the research questions.

The chapter is in two parts. Part One discusses the theoretical context for the research. Section 2.2 starts with a discussion about ontology, epistemology, and ways of knowing in social science generally, and Section 2.3 introduces relevant theoretical constructs in planning and critical policy analysis. While there is no neat body of literature on this research topic per se, there is a substantial body of literature on different ways of knowing between indigenous family farmers and Western agri-science and planning paradigms. Section 2.4 discusses this literature and the concepts and methods from which I have borrowed for this research. Part Two of this chapter places the research in a New Zealand context. Section 2.5 describes the literature on environmental policy and planning in New Zealand and Section 2.6 discusses themes in the literature on farmer-environment relationships in New Zealand within both agri-science and social science. Part Two focuses on New Zealand literature because the research is exploring conflict between intergenerational family farmers and environmental planning processes in New Zealand. The New Zealand situation differs from other countries in two ways. Firstly, as discussed in Chapter One, New Zealand's environmental planning process centred on the RMA and the concept of sustainable management is unique (Memon, 1993; Memon & Gleeson, 1995; Perkins & Thorn, 2001). Secondly, since 1984, New Zealand farmers have not been supported by any form of government subsidy or minimum payment for either production or on-farm environmental management, which distinguishes them from farmers in many developed countries including most European countries, the United Kingdom, the USA, and Japan (Jay, 2007; Fairweather et al, 2009; Sayre, 2014). For this reason alone, economic factors may have greater influence in non-indigenous intergenerational family farming culture in New Zealand than in other countries, and Burton (2004) suggests that subsidies for British agriculture may explain, in part at least, why British farmers focus on production more than profitability."

Part One – Theoretical Context

2.2 Social Science Research Frameworks and Approaches

Knowledge and ways of knowing are an important consideration in this research for two reasons: firstly, because it is an important consideration in all social science research (Graham, 1997; Liamputtong & Ezzy, 2005); and secondly, because this research investigates the existence and characteristics of ways of knowing farming and environmental management that may not be recognised in mainstream agri-science and environmental planning paradigms in New Zealand. Ontology and epistemology are important concepts in debates about ways of knowing, yet the concepts are used differently between social science disciplines and researchers. For example, traditional philosophical scholars such as

Forsberg (1992) distinguish between ontology as fact – how the universe is, and epistemology as creative and subjective – how someone perceives or understands reality. This understanding of ontology hinges on the acceptance of a factual universe that exists independent of realities, the latter being created and subjective. Many post-modernist researchers distinguish between ontology and epistemology within the context of social-constructed realities (Young, 1991; Forsberg, 1992). In that context, people's fundamental understandings about reality or how the world is are often described as ontology, and their understandings about ways of doing and being which are open to change are considered to be epistemology. (Young, 1991; Goertz and Mahoney, 2012; Albrechts, 2017). To avoid confusion and entanglement in interesting but adjunct issues, I will refer in this research to 'different ways of knowing', characterized by different methodologies, conceptual understandings and underlying assumptions of reality. However, an essential part of reconciling conflict based on different ways of knowing within the environmental planning process involves exploring the extent to which some aspects of knowing are indisputable knowledge for the actors or assemblages involved and, as such, limit their ability to recognise and validate other ways of knowing. At that point, reconciling conflict between planners and resource users may require more fundamental changes to environmental planning processes than embracing mutual learning and co-production of knowledge. This, I believe, is Duncan's (2016) point cited in Chapter One.

Graham (1997) identifies two fundamental knowledge assumptions underlying social science research frameworks: naturalism – assuming knowledge of humans is the same as that of the natural world and that human beings follow general laws of behaviour; and anti-naturalism - assuming human behaviour cannot be understood in the same way as natural laws because human behaviour is influenced by consciousness, desires and beliefs. She argues,

> "…while on either side of this divide there are secondary choices to be made…ultimately…you cannot be both a naturalist and an anti-naturalist" (Graham, 1997, pp18-19).

Most research in physical sciences and a substantial body of research in social science is undertaken within research frameworks that sit in Graham's (1997) 'naturalist' category (Thompson & Woodward, 2004; Liamputtong & Ezzy, 2005). They have their origins in the works of Enlightenment scientists such as Kant and Descartes and are underpinned by an understanding of the existence of a measurable, material world separate from human beings, that can be investigated and understood through empirical observation, measurement and deductive reasoning (Herde, 1999; Goldblatt, 2004). There are various research frameworks underpinned by this understanding of knowledge, and in this chapter the term 'positivist research framework' is used as a generic term for those frameworks.

In positivist research frameworks human-environment relationships are assumed to be a subject-object dichotomy and knowledge is existential, conceptual, fixed and universal. Language is the means to express generally understood concepts and meanings, and people's actions are assumed to be an expression of their motivations: people say what they do and do what they think (Herde, 1999). Therefore positivist research frameworks focus on behaviour – what actors do and assume from those actions the motivators for why they do it. Consequently, general laws of behaviour or causal relationships may be deduced from research and experimentation (Graham, 1997; Winchester & Rolfe, 2016; Johnson & Madge, 2016). Researchers within positivist frameworks strive for 'objectivity' by employing research

protocols and methods that will not influence the results: for example, using standardised and repeatable methods of data collection and analysis, not interacting with or influencing the research variables (or participants), and limiting any conclusions to observations or deductions based on those observations (Herde, 1999; Liamputtong & Ezzy, 2005).

Research frameworks which fall within Graham's (1997) 'anti-naturalist' category are based on assumptions that knowledge and knowing are contextual and variable over time, place and personal experience. Within this broad category are a variety of theories about how contextual knowledge is created and the extent to which it is shared between individuals. Contextual knowledge research frameworks have their origins in hermeneutics[7]. The Greek noun hermeneia translates as interpretation or explanation (Herde, 1999) and hermeneutics may be described as "the critical theory of interpretation" (Liamputtong & Ezzy, 2005, p.27) or "understanding action in context" (Herde,1999, p.3). Hermeneutics was originally employed in the study of Biblical texts, considering the context within which they were written rather than a literal meaning of the words (Rickman 1988; Graham, 1997; Herde, 1999). By the nineteenth century hermeneutics was secularised and the subject matter broadened to become a key discipline in study of the humanities by scholars such as Dilthey, Schleiermacher and Humbolt (Rickman, 1988; Herde 1999). Hermeneutic research frameworks assume that while knowledge is contextual there are shared realities or understandings between people who have similar cultural and life experiences; 'shared realisms' as opposed to one universally accepted realism or realisms which are unique to individuals (Graham, 1997; Liamputtong & Ezzy, 2005; Johnson & Madge, 2016). Graham (1997) notes that within various research frameworks or 'isms' there are complex ideas and variances, and within hermeneutic research frameworks Herde (1999) distinguishes between epistemological hermeneutics – understanding by doing, and ontological hermeneutics – understanding by being. Critical hermeneutic research frameworks go beyond seeking knowledge and use research to improve social conditions (Rickman, 1988; Herde 1999).

Language is key to hermeneutic scholarship. Rosenberg (1994, in Graham 1997, p.17) refers to the philosophy of language being as important to humanist geographers as "…the study of differential equations is for physics." In a hermeneutic framework language is an event: language is meaning. Rather than assuming words have universal meaning, hermeneutic scholars argue the meaning given to words is temporal and variable, and the meaning conferred by any utterance must be understood contextually (Herde, 1999; Goldblatt, 2004). History and language affect our interpretation of any situation and through language our interpretation and understanding change (Herde, 1999; Howitt, 2001; Goldblatt 2004; Liamputtong & Ezzy, 2005). Therefore language, particularly people's own story-telling, is a powerful mechanism by which to interpret the relationship between action, motivation and understanding. To that end, Herde (1999) cautions that social science research within a hermeneutic framework is not simply a case of using qualitative data collection methods; it is about understanding the fundamental ontological differences that underly hermeneutic and positivist research frameworks.

[7] After Hermes who was a messenger in Greek mythology whose task it was to interpret the desires of the Gods and convey these to mortals (Graham, 1997, p.16).

While a variety of research methods can be used to generate data within a hermeneutic research framework, language based methods such as oral techniques, textural analysis and observationally-based ethnographies are the methods most widely used (Liamputtong & Ezzy 2005; Elwood 2009; Davis & Dwyer, 2007 in Winchester & Rolfe, 2016, p.9). Winchester & Rolfe (2016, p.17) claim,

> "People's own words tell us a great deal about their experiences and attitudes, but they may also reveal underlying social structures…."

They argue that textual methods are commonly used to, "…throw light on the social processes that underpin, legitimate and resist social structures…" while oral methods "…elucidate both individual experiences and social structures in the holistic sense…" (Ibid, p.17). Thompson & Woodward (2004, p.53) note that "…surveys may record opinions but they cannot interrogate the reasons people have for holding them." To that end, Valentine (1997) and Herde (1999) advocate for the use of oral histories because they enable participants to explain their experiences and raise issues the researcher may not have anticipated:

> "The language we speak holds our history and an investigation into our language reveals a story that we could never hear simply by being a research participant observer or having people fill out a form" (Herde,1999, p.89).

However Crang (2005, p.225) criticises contemporary qualitative human geography as relying too much on oration and interviews, of "…bringing back the data and representing It (nicely packaged up with illustrative quotations)." He calls for more attention to be given to visual and textual sources of data as other legitimate "…ways of knowing" (Ibid, p.230).

Rickman (1988, p.298) argues that interpreting text is as "…time-honoured an activity as observing and explaining nature…" but it has been less subject to philosophical analysis and justification than the principles of science. Therefore science appears "respectable and reliable" and hermeneutics "subjective and inconclusive" (Ibid, p.303). More recently, social scientists have challenged those assumptions and advanced that subjectivity of the researcher and inter-subjectivity between researcher, participants and the research are inevitable, because all humans are social actors (Riessman, 1993; Graham, 1997; Valentine 1997; Stratford & Bradshaw, 2016; Winchester & Rolfe, 2016). In hermeneutic research frameworks subjectivity is considered both inevitable and valuable in social science research because it can lead to new insights and understandings (Herde, 1999; Wijendaele, 2014 in Johnson & Madge, 2016, p.84; Howitt & Stevens, 2016). In addition, because the researcher's positionality and subjectivity are acknowledged and reflected upon in hermeneutic-based frameworks, the research may be more credible than research in frameworks where subjectivity is ignored (Herde 1999; Dowling, 2016; Winchester et al, 2016).

Traditionally, human geography focused on spatial science was undertaken largely within positivist research frameworks, but from the 1970s there has been a greater focus on alternative research frameworks and qualitative research methods (Graham, 1997; Winchester & Rolfe, 2016; Johnson & Madge, 2016). Research into the study of individual cultural geographies has emerged within human geography, firstly with the concept of critical realism (Sayer & Morgan, 1985) and more recently in geographies of performance and emotion, based on the concept that humans are "…emotive and embodied rather than cognitive" (Winchester & Rolfe, 2016, p14). Between 1996 and 2001 the use of

oral histories to research people's connection to place and understanding of their environment was promoted strongly in Australia through the work of Stratford and adopted in the work of human geographers in New Zealand (Stratford, 2001; Hay, 2003; Roche, 2011). Lane (1997) advocates for the use of oral histories to understand environmental change, while George and Stratford (2016) argue that oral history can be a powerful source of situated learning that can facilitate enhanced understanding of space, place, region, landscape and environment among any local community.

Hermeneutic research frameworks are used in the study of alternative ways of knowing among indigenous communities and marginalized social groups, and are accepted frameworks for research into the impacts of public policy and planning processes on these communities (Dryzerk, 1985; Riessman, 1988; Hall 1992; Herde 1999; Sandercock, 2003; Goldblatt 2004) (Johnson 1992; Sandercock, 2004; Rotarangi & Russell, 2010; KIVU, 2015). Hermeneutics is not commonly used in research on farmer-environment relationships in New Zealand or among other non-indigenous farming communities. However Winchester and Rolfe (2016, p.16) note that

> "an important aspect for human geography is its ability to engage communities, understanding their lives and environment and striving to empower those communities and give them voice as active participants in the research endeavor to understand ourselves and our environment."

As such, researching within a hermeneutic framework may offer new insights and explanations for conflict between non-indigenous intergenerational family farmers and environmental planning processes than the 'economic versus environment' proposition that prevails in planning literature and practice in New Zealand.

Another way to know social reality and research social processes is Assemblage Thinking. Assemblage Thinking is grounded in Deleuze's (1968 in DaLanda, 2002) notion that social and material formations are assemblages of other complex configurations which, in turn, play roles in other more extended configurations. Lewis et al (2013, p.185) define an "assemblage" as,

> "a socio-spatial formation that is brought into being by knowledge production, notably by assembling economic practices, relations and trajectories of thought and action. Assemblages are thus known and practiced into being and become space-framing."

Because social-constructionist realities assume reality is a construct within people's minds, Van Wezemeal (2017) argues it assumes an essentialist perception of matter as inert, passive and docile – waiting to be uncovered and understood through communicative processes. Assemblage Thinking is premised on the understanding that connectivity and collectively between actors, institutions and networks in space and over time creates knowledge and action. Every spatial, social or communicative ensemble is a product of the interaction of heterogenous elements. Therefore, Assemblage Thinking describes systems on the basis of their interactions, non-linearity, instability, self-organisation and unpredictability (Van Wezemeal, 2017). It studies both existing assemblages and what may be required to bring them into existence and hold them together (Greenhough, 2011 in Lewis et al, 2013, p.185). Assemblage Thinking is an emerging trend in social science research including urban geography and, as will be discussed in Section 2.5, in research on biological economies in New Zealand. Van Wezemeal (2017, p.333) describes Assemblage Thinking not as a theory but as a 'knowledge ontology' – a way of understanding how society interacts and knowledge is created which can be applied to any discipline.

Assemblage Thinking is only recently emerging in planning theory where it has been used primarily as part of critiques of Communicative Planning Theory through reintroducing a focus on materiality, technology and space without losing the ability to address other aspects of planning processes such as uncertainty and fluidity which are not acknowledged in Rational Planning Theory. It puts the 'who', 'why' and 'how' into planning practices. Assemblage Thinking is relevant to this research because the topic considers interaction and conflict between assemblages: the actors, institutions, and networks that collectively constitute non-indigenous intergenerational family farmers and environmental planning processes in Canterbury, and how they interact with one another and other assemblages such as agri-science. It is not a study of interaction between individual farmers, planners and scientists or institutions. This research assumes both the assemblage that is non-indigenous intergenerational family farmers and that which is the environmental planning process have ways of knowing and doing that are greater than the sum of the actions of individual actors: as assemblages they have their own characteristics, interactions, motivations and memories. Assemblage Thinking considers how assemblages combine and interact, both those which exist currently, and the potential to create others.

2.3 Planning Theory

Forester (2008) suggests planning theory is what planners need when they get stuck and it is certainly the starting point for trying to answer my research questions. Ploger (2017, p.264) describes planning as "permanent conflict" and planning theory concerns itself with managing that conflict, with the intent of ensuring outcomes are an improvement on those which would ensue without intervention. What constitutes an improved outcome depends on the goals of the planner and the planning process and Friedmann (1985, in Friedmann & Huxley, 1985, p.38) distinguishes between two goals in planning: state or corporate planning that seeks social maintenance; and advocacy planning that seeks social transformation.

As an applied discipline, planning has been influenced by theories and concepts from other social sciences, notably human geography, sociology and political science (Friedmann, 2008; Fainstein & DeFilippis, 2016) and has followed major trends in social science theory. However it has also developed its own body of theory specific to the social phenomena that is the concept and process of planning. Planning theory falls into two camps: theory of planning practice or how to do planning; and theory on the social phenomena which is the planning process and how it is shaped by and reinforces underlying socio-political and socio-economic forces (Hall, 1992, Forester, 2008). Hall (1992) refers to this latter body of planning theory as critical policy analysis. This section focuses on theories of planning practice which have been particularly influential in environmental planning processes by the state in New Zealand; Rational Planning Theory and its post-modernist counter-parts, Transactive Planning Theory and Communicative Planning Theory. Then, it turns its attention to relevant theories in critical policy analysis about the phenomenon that is the public planning process per se.

While arguably planning can occur in relation to any subject matter, the modern discipline of environmental planning has its origins in the town planning and wilderness movements in the United Kingdom and United States in the latter half of the nineteenth century. Rapid population shifts from rural to urban areas with industrialisation in the nineteenth century resulted in calls for government controls

over building standards and urban design, for both public health (sanitation) and amenity values (Hall, 1992; Miller, 2017). These early forms of planning were spatially oriented and sat within the domain of surveyors and architects. They are described in the literature as 'blueprint planning' or 'master planning' (Radcliffe, 1981; Miller, 2017). However it was during this era that Scottish surveyor Patrick Geddes is credited with introducing the basic concepts of Rational Planning Theory: survey-analyse-plan (Radcliffe, 1981; Hall, 1992). Simultaneously, movements were occurring within both the United States and the United Kingdom promoting the human benefits of connecting with nature and calls for the 'protection' of specific tracts of land as reserves or national parks (Ortolano, 1984; Pawson, 2002). It is within this context of land use planning, that Hall (1992) derives his definition of planning cited in Section 1.2 and describes planning as, "essentially human geography…harnessed or applied to the positive task of action to achieve specific objectives" (Ibid, p.9).

These origins of planning gave rise to four key ontological assumptions that underpin Rational Planning Theory, sometimes referred to as Modernist Planning Theory. They are: an understanding of planning issues as conflicts between land uses or competition between vested interests in the values of land for utility; secondly, the necessity of state-sanctioned planning to mediate between or manage this conflict; thirdly, the notion of the 'neutral' planner motivated to act 'in the public interest'; and finally a 'scientific' approach to planning undertaken in positivist research frameworks (Freidmann, 1973; Hall, 1992). Sandercock (1998, p.4) describes such understandings as a 'modernist portrait of planning' where the underlying assumption is that, "…planning is a 'good thing' – a progressive practice undertaken by a rational planner acting in the public interest…."

After World War II planning became strongly influenced by cybernetics and systems management (Hall, 1992). The emphasis shifted from planning for space to planning for systems, and maps gave way to flow diagrams, policies and controls. During the 1950s and 1960s Rational Planning Theory reached its peak (Lindblom, 1959; Radcliffe, 1981). Rational Planning Theory assumes the world operates to one essential or sometimes transcendental logic and knowledge is achieved through deductive reasoning, applying scientific methods to planning practice (Sandercock,1998; Van Wezemeal, 2017). The planner is a scientist with an objective view, whose role is to identify rational trade-offs between given interests using the best scientific methods. This scientific form of planning is executed using the Rational-comprehensive Planning Model. In this model the planner is at the forefront of the planning process following a step-wise process; starting with identifying the goal or objective before gathering appropriate 'scientific' information and identifying and evaluating alternative management options to achieve the goal. From the evaluation, the planner selects and implements the 'best' management option (Lindblom, 1959; Freidmann 1973, 2008; Hall, 1992).

Alternative theories of planning practice have emerged largely as critiques of Rational Planning Theory and the Rational-comprehensive Planning Model (Friedmann, 2008; Innes & Booher, 2015; Fainstein & DeFilippis, 2016). Political scientist Charles Lindblom (1959) arguably published the first critique in his paper, "The Science of 'Muddling Through". Lindblom argued the Rational-comprehensive Planning Model is impossible to achieve when planning for complex social problems with competing values. In such circumstances it is difficult to identify an agreed objective(s) and there is never enough time or money to identify and evaluate all options. Lindblom (1959, p.81) advocated for an alternative planning

model he called “Successive Limited Comparisons”. In this model planners start by identifying a small number of alternative policy choices that offer different marginal combinations of values, and these policy choices are evaluated only to the extent they differ from the status quo, creating an empirical comparison of marginal differences. Lindblom (1959) justified his model arguing that Western democracies change their policies almost entirely through incremental adjustments in chronological fashion, and that such a process avoids serious, lasting mistakes. However Lindblom’s (1959) Successive Limited Comparisons Model remained grounded in Rational Planning Theory.

The emergence of social science research in social-constructionist realities in the 1960s led to the development of post-modernist planning theories, including Friedmann’s (1973) Transactive Planning Theory. Transactive Planning Theory is a theory of planning practice based on an understanding that planning is changing knowledge into action through an unbroken sequence of interpretative relationships (Friedmann, 1973). Those interpretative relationships occur between individuals, not institutions and it is those individuals and the relationship they have with clients which determine the success of planning processes (Friedmann, 1973). In Transactive Planning Theory conflict in planning practices is the result of different ways of knowing between planners and clients. Those different ways of knowing are compared in Figure 2, and encompass knowledge, language and interactions.

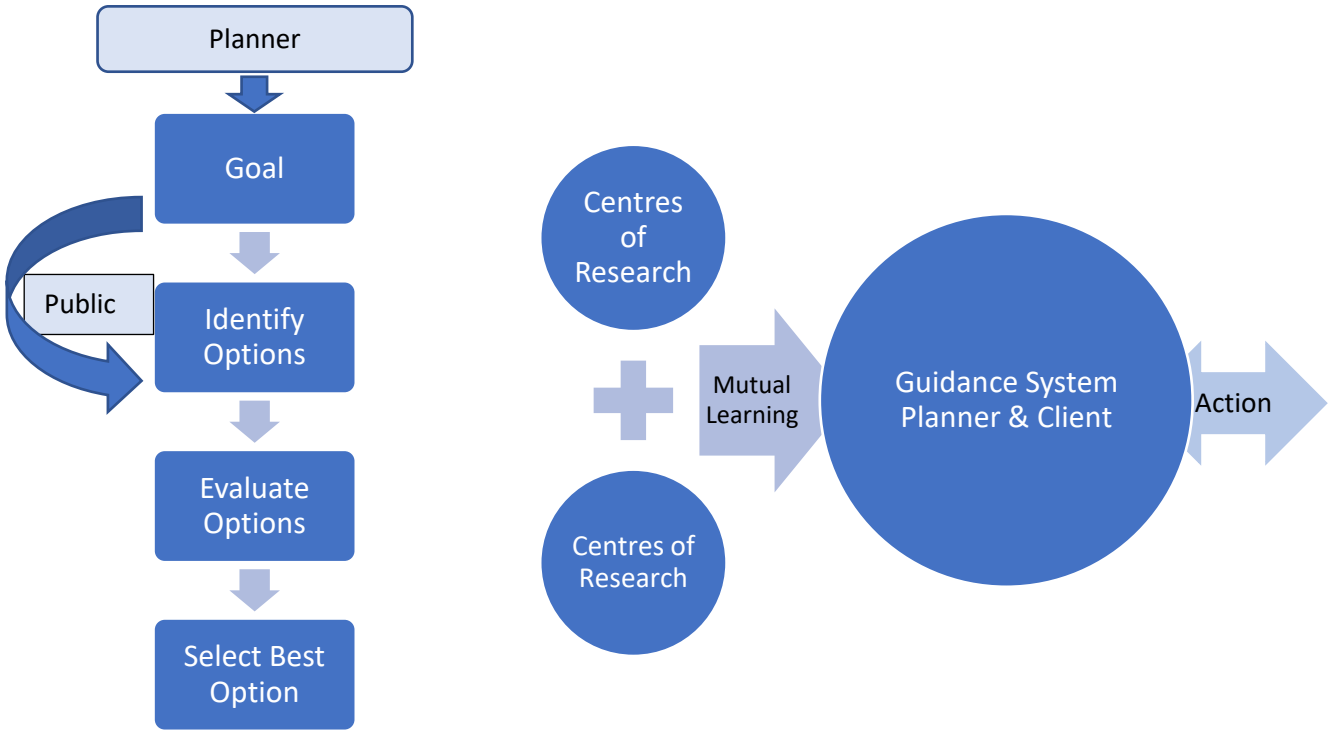
Figure 2: Friedmann’s (1973) Comparison of Ways of Knowing Between Planners & Clients

Variable	Planner	Client (People in Place)
Knowledge	• Processed • Abstracted from real world • Theory & scientific method • Limited in scope • Generalised explanations for the behaviour of a few variables under specific constraints	• Personal • Experience & contextualised. • Richer in content & detail • Less systematised & generalised • Creates a meaningful whole in practice but not related to theory
Language	• Conceptual • Strives to be ‘objective’ • Written to enable peer review so its verifiable in logic, empirical observation & theoretical coherence. • Models & concepts unfamiliar to clients	• Experiential & contextual • Own jargon to speed communication • Meaning can change with context • Manner of expression important
Interactions	• Planner to planner • Universities for advancement of professional knowledge • Professional institutions mould behaviour & reinforce planners competence when being challenged by ‘outsiders.’	• Relate to their own organisations • Planners lack practical knowledge • Planners admired for specialist knowledge

Freidmann (1973) argues conflict in planning practice is not resolved by simply translating the abstract and symbolic language of the planner into the more experiential vocabulary of the client. Rather the real solution involves a restructuring of the basic relationships between planner and client. This is done by a

process of ‘mutual learning’ which Carroll and Hendrix (1992) suggest builds on sociologists Berger and Luckman’s (1967, in Carroll & Hendrix, 1992, p.350) concept of “construction of a joint reality.” ‘Mutual learning’ occurs through developing dialogue. Dialogue occurs in two parts: personal-centred communication to develop interpersonal relationships, which Freidmann (1973, p.18) calls ‘the life of dialogue’; and subject matter-related communication. Both forms of dialogue are indispensable in planning because ‘subject matter-related’ dialogue cannot be sustained for long without ‘the life of dialogue.’ Without dialogue, Friedmann (1973) argued thought is reduced to theorems and action to energy. As the agents of change, planners, should take the lead in the planning process, but Freidmann (1973) maintained the ways of knowing of both planner and client are equally valid and contribute to a process of mutual learning on a shared footing: no one is master. The more a planner assimilates the client’s knowledge, the more aware they become of the complexity of planning issues (Friedman, 1973). To that end, he cautions against planners trying to accelerate the mutual learning process or coercing behavioural change. Figure 3 shows a comparison of planning practice in accordance with Rational Planning Theory (left) and Friedmann’s (1973) Transactive Planning Theory (right).

Figure 3: Rational Planning Theory (left) & Transactive Planning Theory (right)



(After Friedmann, 1973 in Hillier & Huxley, 2008, p.27)

Transactive Planning Theory has been employed in nature or wilderness planning processes in the United States including forest management in Montana (Freidmann & Huxley, 1985) and protection of Wild and Scenic Rivers (Carroll & Hendrix, 1992). While it is not identified as such in the literature, the planning processes used by Pest Boards, Catchment Boards and the QEII Trust in New Zealand described in Section 1.2 (Chapter One) are grounded in Transactive Planning Theory.

Communicative Planning Theory has its origins in Transactive Planning Theory but has been shaped by social science research in communication in the 1980s, in particular Habermas' (1981) "Critical Theory of Communication." It was first mooted by Forester (1989) in his book "Planning in the Face of Power" and is underpinned by understandings of the role of discourse in producing accepted realities, with the notion that a more inclusive form of decision-making can be achieved through negotiation (Wezemeal, 2017). The concept was advanced by other researchers including Innes (1995), Innes and Booher (1999, 2010) and Healey (2006, 2009) who looked at consensus building, alternative dispute resolution and collaboration as governance tools to determine outcomes. While Transactive Planning Theory focuses on dialogue, Communicative Planning Theory considers all forms of communication including listening, story-telling, rhetoric, mediation and metaphor, and rethinks models of public participation (Sager, 2017). In Communicative Planning Theory public participation is extended to all parties affected by a planning process and the planner becomes the facilitator or mediator of the communicative process rather than the solution-finder. The process itself delivers the solution through consensus or collaboration.

Sager (2017) suggests that Communicative Planning Theory brings to the forefront everything that is relegated to the 'shadows' in Rational Planning Theory; the iterations of planners and people in the planning process. Technical activities such as Environmental Impact Assessments are not ignored but public perceptions and people's input are given greater priority. However Communicative Planning Theory has its critics, too. It is criticised for focussing on process and not having mechanisms to ensure good planning outcomes, particularly given participatory or communicative processes can be manipulated or captured by powerful social groups (Mees, 2003; Fainstein & Fainstein, 2013). Wezemeal (2017) suggests Communicative Planning Theory assumes the planner's interventions can achieve collaborative solutions without thinking about other forces which govern the actions of human and non-human assemblages. Finally, Communicative Planning Theory is criticised by Radical Planners as reinforcing rather than transforming dominant eco-political ideologies, including neo-liberalism (Purcell, 2009; Beaton, 2017). Sager (2017) responds to that criticism pointing out that Communicative Planning Theory is based on very different principles from neo-liberalism. However, Allmendinger and Haughton (2012, p. 94) suggest that,

> "Planning tends to adapt very quickly to reflect the dominant ideology and priorities of the age….planning is, after all, the main mechanism through which the state seeks to manage land use changes…."

Communicative Planning Theory and collaborative planning processes are pertinent to this research because the freshwater planning process in Canterbury that forms the subject of Duncan's (2016) paper cited in Chapter One, and one of the case studies in this research in Chapter Seven, involved a 'collaborative' planning process. However the freshwater collaborative planning process in Canterbury occurred within a planning framework under the RMA, underpinned by Rational Planning Theory and a Rational-comprehensive Planning Model, and within a planning environment which has been ideologically grounded in neo-liberalism for over 20 years. When understood within this context, it becomes clearer why the collaborative planning processes for freshwater in Canterbury may have struggled to reach the consensus solutions advocated in Communicative Planning Theory, and why Duncan (2016) reached a

conclusion that the ways of knowing between planners and resource users in that process were incompatible.

While Forester (1989) claims planning theory helps when planners get stuck, I suggest critical policy analysis helps more. To that end, Dryzek (1982, p.309) argued for the importance of critical policy analysis in the early 1980s, noting that, "gone are the heady days of the 1960s when it was believed that given enough analysis and…money, it was possible to solve any social problem." Critical policy analysis examines the underlying political, social and economic structures that influence the public planning process as a social phenomenon, and which act as barriers to or catalysts for social transformation. As such, this branch of planning theory is often associated with 'radical planning' and scholars are often strong advocates of the use of critical hermeneutic research frameworks to change social conditions (Dryzek, 1982.; Herde, 1999; Liamputtong & Ezzy, 2005). Fischler (2000) identifies two underlying schools of thought in critical policy analysis: scholars who embrace Habermasian-inspired theories about the role of communication collectives as drivers of social change; and those who follow Foucauldian or Marxist-inspired theories about the role of power and/or knowledge structures as agents of social maintenance or barriers to change.

Dryzek (1982) advocates for the importance of hermeneutics for dealing with 'messy cases' in policy and planning. He describes 'messy cases' as those which involve a multiplicity of actors and interests, which are not producing manifestly good outcomes, and where conflicting and uncertain values are the norm. Dryzek (1982) suggests that while phenomenology and ethnography can be used to describe or explain existing conditions or situations, critical hermeneutics enables existing situations to be evaluated and alternatives explored that may improve outcomes or conditions. Other scholars in critical policy analysis and radical planning such as Herde (1999), Howitt (2001) and Sandercock (2003, 2004) champion the use of critical hermeneutic research frameworks to change social conditions. Herde (1999) argues that to effect positive change, planners and policy advisors need to share not only an understanding of the system they are planning for, but *the same* understanding of the system as the people they are planning for. Writing in radical urban planning, Sandercock (2003) argues that language expressed as narrative is the way in which people understand and describe their relationship to space and life, and that such stories can provide a rich understanding of the human condition. However narrative as communication is not used to its full advantage within planning processes because it is seen as 'soft' and 'unscientific' (Howitt, 2001; Sandercock, 2003).

Goldblatt (2004) maintains that societies shape the production of knowledge and that the importance or validity of different types of knowledge changes over time. Language is powerful in determining valid forms of knowledge because knowledge cannot be expressed without it. As well as language, critical policy analysis considers the role institutions play in shaping the content and understanding of knowledge systems and therefore planning processes Goldblatt (2004, p.3) suggests that:

> "…while language creates the shapes for how we see the world and the things we do not see….institutions exert powerful effects. They determine, for example, who has access to specialised knowledge languages…and who has socially sanctioned and legal authority to make pronouncements on a given subject".

Herde (1999), Howitt (2001) and Bromley (2004) posit that many contemporary environmental problems result from a relationship with the natural world that is dominated by a scientific outlook and its application in technology to enable social progress. To that end, they suggest planning is predicated ontologically on a linear, progressive view of time which is manifested in concepts such as goal setting, progressive action and achievement. Howitt (2001, p.16) argues that these dominant paradigms in planning or resource management, "…produce inadequate resource managers but they also block the development of 'bottom up' approaches to key issues." Bromley (2004, p.81) suggests that this commitment to science and technology to address environmental issues reflects,

> "…a political ideology committed to a notion of 'progress' based on the continuous application of scientific reason to understanding the natural world and to using the knowledge generated to build technologies that control or 'master' our natural environment."

In Chapter One, I referred to the assumption in agri-science and environmental planning in New Zealand that farmers who invest in agri-science advice and technology are better environmental managers than those who 'farm in accordance with Grandad's diary'. Applying the above critique of planning, I argue the notion that successful farming and environmental management can be achieved 'farming in accordance with Grandad's diary' challenges political ideologies of technology as the source of progress and science, learned in a formal academic setting, as the source of knowledge.

Bromley (2004, p.78) suggests, "…modern political ideologies need to be aware of their own cultural, historical and theoretical preconditions" and Beaten (2017) argues Neo-liberalist Planning Theory has had a major influence in contemporary Western planning paradigms. He describes Neo-liberalist Planning Theory as an assemblage of rationalities, strategies, technologies and techniques that allow neo-liberal principles to rule in planning practice without major contestation because, while it implies a partial retreat of state planning from economic life, this retreat is, in itself, a form of planning (Ibid, p,108). Keril (2009 in Beaten, 2017, p.108) claims that as a result of this lack of contestation, neo-liberal practices become normalised in people's mindsets as the 'way things are' and this mindset manifests in planning practices to the point where its ideological foundations become invisible.

As described in Section 1.2, New Zealand's contemporary environmental planning process is underpinned by neo-liberalist principles which have resulted in an environmental planning process which Bührs (2000) describes as minimalist and negative, focusing on adverse effects of resource use and without any social aspirations. I argue that nearly 30 years of neo-liberalist planning in New Zealand with a limited focus on environmental effects, has resulted in planning theory and critical policy analysis giving way to environmental science. Consequently, the environmental planning process is losing awareness of its ideological foundations. New Zealand's contemporary epistemology of state planning is becoming an ontology of planning – in the context of being understood by planners as 'the only way' in which planning is done. This may be why Duncan (2016) argues the ways of knowing between policy-makers and farmers over freshwater in Canterbury are becoming incompatible. However, such claims beg two questions: to what extent are planners and farmers ways of knowing incompatible; and how is such incompatibility managed? As aforenoted these questions are not tackled within conventional Western planning theory, but they have been long-debated in the literature on Indigenous Planning and TEK.

2.4 Indigenous Planning and TEK

Indigenous planning describes a body of research within planning theory and practices which recognises indigenous communities as having their own environmental management and planning systems, and the role which colonial planning frameworks underpinned by Western science and planning paradigms have played in frustrating those systems. It sits at the intersection of literature on planning and Indigenous Knowledge or Traditional Environmental Knowledge (TEK). The focus of indigenous planning literature is on self-determination – that is planning by rather than for indigenous people, and changes required to environmental planning processes to recognise and make room for indigenous planning (Porter, 2017). The literature is pertinent to this research because it considers the values underpinning Western planning processes and barriers to recognising planning and environmental management systems underpinned by different ways of knowing.

TEK describes a body of literature which has, over the last 30 years, considered conflict between the cultural knowledge of rural communities and Western agri-science and planning paradigms. Whyte (2013, p.2) describes TEK as "Knowledge production systems whose values have been overlooked or disapproved of by scientists and policy-makers." As noted in Chapter One, there is no universally agreed name for or definition of TEK in academic literature and TEK is not a universally agreed concept. Also there are differing views between scholars as to whether TEK is an indigenous concept (Smith, 1999; Nadasay, 1999; Butler & Menzies, 2006; KIVU, 2015) or whether it may be found among non-indigenous communities who live and work in nature such as fishers and farmers (Johnson, 1992; Whyte, 2013 Bocco and Winklerprins, 2016). As noted in Chapter One, that debate is a thesis in itself and it is not my intent to argue that the participants' farming culture is a form of TEK. Rather, I am borrowing from TEK literature concepts, methods and observations of different ways of knowing between farming communities and Western planning and agri-science paradigms.

In Chapter One I referred to Berkes (2012) definition of TEK. Similarly Bocco & Winklerprins (2016, p.375) describe TEK as:

> "…encompasses environmental knowledge acquired by people native to, or long-term inhabitants of, specific places, over long periods of time; knowledge which is then assumed to apply only to those local areas."

Berkes (2012, 2018) and Whyte (2013) identify three basic understandings of TEK in academic literature: TEK as an historic and archival body of transferable knowledge that may help manage environmental issues; TEK as lived, situational knowledge that must be understood in context; and TEK as ontology or being. These different understandings of TEK underpin views in the literature as to whether TEK is reconcilable with Western agri-science and planning paradigms.

Research into indigenous TEK emerged from two sources: growing international concerns about the environmental impact of western agricultural and industrial economies; and indigenous rights movements (Butler, 2006; Palmer & Reed, 2007; Berkes, 2018). The Brandt Commission's Report, 'North-South: A Program for Survival' (1980) is credited with promoting the potential of indigenous cultural knowledge to address modern environmental issues (Johnson, 1992; Muchena & Vanek, 1995) and this theme

continued in international forums in the 1980s, including: the Traditional Ecological Knowledge Working Group of the International Conservation Union (1984-89); the Brundtland Report (1987); the World Conservation Strategy (1989); and the Farmer First: Farmer Innovation and Agricultural Research Programme (1987) (Chambers et al 1989). In this context TEK is assumed to be an archival body of transferable knowledge.

In 1991, the Sustainable Agricultural Programme of the International Institute for Environment and Development launched a three-year programme, 'Beyond Farmer First: Rural People's Knowledge, Agricultural Research and Extension Practice'. Scoones and Thompson (1994) identify this programme as shifting the focus from understanding indigenous agricultural knowledge as different but parallel knowledge to agri-science, to understanding indigenous agricultural knowledge as cultural knowledge. TEK research in post-colonial research frameworks argues that indigenous cultural knowledge must be understood within context and identified associated challenges with merging cultural knowledge into Western planning paradigms. For example, Berkes (2018) notes that the Western concept of 'conservation' based on setting aside land or resources from any use is not shared in most indigenous cultures where concepts of conservation are based on relational values that are personalised, place-based and kinship-oriented (Howitt, 2001; Berkes, 2018). Howitt (2001, p.26) observes how those different ways of knowing play out in contemporary environmental issues: "…environmentalists have often opposed indigenous use and occupation of (even access to) lands they classify as having high conservation values." Similarly, Berkes (2018, pp46-47) cites examples of how the land use practices of indigenous communities in the Kaz Mountain National Park in Turkey and the Keoladoe National Park in India are banned to protect the very biodiversity values those land uses created.

McGregor (2008, p.145), researching Australian aboriginal communities, argues, "For Aboriginal people, TEK is not just about understanding relationships, it is the relationship with Creation." He and other scholars for example Smith (1999), Nadasay (1999), Matunga (2002), and Porter (2004) represent a third school of thought that argue conflict between indigenous cultural knowledge and Western planning paradigms is not reconcilable in colonial planning and legal frameworks. Rather they argue for decolonisation through the right of indigenous cultures to self-determination over their land and resources using their own planning systems.

Despite these different schools of thought about TEK, across the literature authors identify characteristics which are indicative of different ways of knowing from Western science. Menzies and Butler (2006) describe TEK as local, holistic, embedded in cultural context, with moral and spiritual elements. It is place-based: people have an ontological understanding that they are in and of their land and know themselves and their environment through a kincentric or spiritual connection with place. The environment is a whole in which people are an integral part: resource use and protection are one in the same (Howitt, 2001; Berkes, 2012). This way of knowing nature is compared with Western science which is described as underpinned by an understanding of human-environment relationships as a subject-object dichotomy and nature as a collection of natural resources or elements (Johnson, 1992; Whyte, 2013). TEK knowledge is described as contextual and experiential rather than conceptual and theoretical (Scoones & Thompson 1994a; Berkes 1998, 20120. It is acquired through observation and practice and transmitted

intergenerationally (Johnson, 1992; Butler, 2006; KIVU, 2015). Although knowledge is intuitive, it is organized and includes systems to classify taxa, soils and landscapes, and social sanctioned systems that govern resource use (Tipa & Welch, 2006; Panelli & Tipa, 2007; Dahl, 2015; KIVU, 2015; Moller et al, 2015). Cultural knowledge is dynamic, adapting to changes in conditions, technology, and influences of other cultures (Alcorn, 1994; Scoones & Thompson 1994a; Butler, 2006; Berkes, 2012; Whyte, 2013; Dahl, 2015).

Johnson (1992) writing early in TEK literature included a comparative table to make her point about different ways of knowing between TEK and Western science, but care must be taken in portraying different ways of knowing as simple alternatives. Scoones & Thompson (1994a, pp 29-30) describe TEK and Western science as 'not so different'; both are "…general and specific, theoretical and practical...value-laden, context-specific and influenced by social relations of power…." Agrawal(1995, p,433) suggests that,

> "…to create distinctions in terms of indigenous and Western is potentially ridiculous. It makes much more sense…to talk about multiple domains and types of knowledge with differing logics and epistemologies…."

Similarly, Bocco & Winklerprins (2016, p.381) dismiss arguments about similarity and difference in the epistemologies of TEK and Western science: "This does not move us forward as TEK and scientific knowledge are different ways of knowing." Kimmerer (2002, in Whyte 2013, p.6) and Menzies and Butler (2006) describe TEK and Western science as alternative environmental management systems and suggest both have a role in contemporary environmental management.

Some geographers have explored the role of local environmental knowledge of non-indigenous communities in planning and environmental management (Campbell, 1994; Lane 1997; George, 1999a). This research tends to focus on the value of local environmental knowledge as an information source rather than cultural knowledge. To this end, Indigenous Planning and TEK literature is helpful for this thesis because it provides a framework for evaluating cultural knowledge as a different way of knowing from Western science and planning paradigms. TEK literature includes research frameworks and methodologies which are accepted as appropriate for researching cultural knowledge in context. In addition, some of the insights and observations in the literature of different ways of knowing between indigenous farming communities and Western agri-science and environmental management are similar to observations I have made about conflict between non-indigenous intergenerational family farmers and environmental planning processes in Canterbury. Finally, Indigenous Planning and TEK literature explores different ways of knowing at a deeper level than Western post-modernist planning theories and critical policy analysis. Although grounded in social-constructionist realities, post-modernist planning theories assume a level of cultural uniformity among non-indigenous, socially dominant groups in Western societies; and that such cultural uniformity aligns fundamentally with that underpinning Western science and planning paradigms. For example, all Western planning theories assume: the human-environment relationship is a subject-object dichotomy (Herde, 1999); that people order their world into separate and potentially conflicting spheres of economy, society and environment; that people understand knowledge as a separate concept from way of life and value scientific or technical knowledge (Nadasay, 1998); and that it is appropriate for the state to provide a framework for environmental

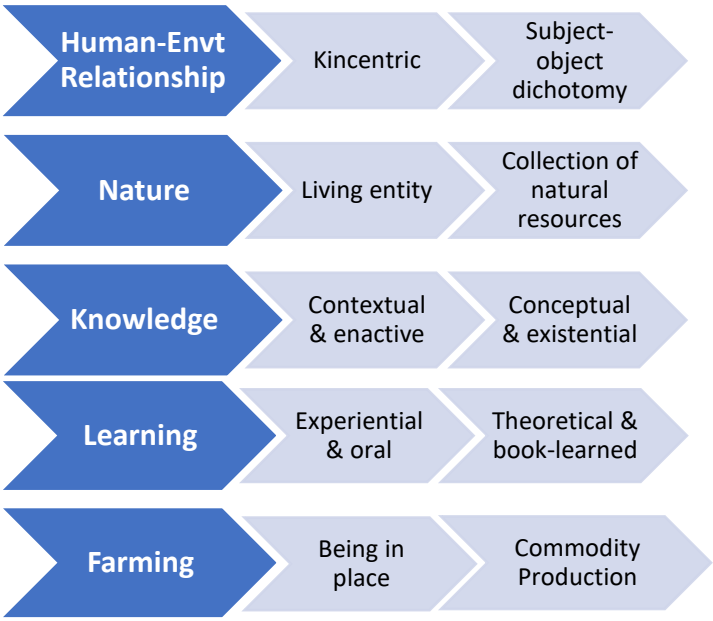
management separate from and imposed upon landholders or resource users (Sandercock, 1998; Bührs, 2000).

Sandercock (2004) and Porter (2017) argue that a colonial mentality lingers in political and governance institutions which is reflected in planning law and practice. Sandercock (2004, p.119) suggests that in trying to recognise indigenous rights, "…planners are confronted with values immeasurable with modernist planning…." To illustrate that point, Paul Nadasay (1999: pp5-6) quotes an explanation from an indigenous hunter at Burwash Landing in the south-west Yukon Territory, Canada about why the government cannot effectively manage wildlife:

> "He complained that government officials would not act without first gathering knowledge from all its experts. But this is easier said than done…because the government has forestry experts, water experts and mining experts; it has sheep biologists, moose biologists, wolf biologists and bear biologists; and none of these people know anything outside of their own speciality....The government is powerless to act without endless meetings in which these specialists attempt to 'educate' one another; and even then no one really understands the environment as a whole…."

Indigenous Planning and TEK literature 'opens our eyes' to the taken-for-granted assumptions that underpin Western planning paradigms. It contains key signposts or indicators for identifying different ways of knowing and doing environmental management. Some of these signposts are depicted in Figure 4.

Figure 4: Signposts for Different Ways of Knowing in Environmental Planning



These signposts are not intended to depict an 'either/or' comparison between different ways of knowing. Rather they are 'bookends' of a spectrum along which multiple ways of knowing fit. As such, they can be used to create an analytical framework for identifying and articulating cultural knowledge and associated environmental management systems. To that end, the different language and knowledges of planners

and clients identifed by Freidmann (1973) in Transactive Planning Theory, shown in Figure 2 (p.22), fit within the spectrum of indictors or signposts of knowledge and learning shown in Figure 4.

TEK has been researched in colonial, post-colonial and de-colonising research frameworks. Colonial research frameworks are underpinned by the same assumptions of valid forms of knowledge and knowing that underly positivist frameworks and regard the 'Indigenous Other" as an alternative and in some cases inferior source of universal knowledge to Western science (Cornwall et all, 1994; Scoones & Thompson, 1994a; Howitt & Stevens, 2016; Johnson & Madge, 2016). Post-colonial research aims to contribute to the self-determination of indigenous peoples through methodologies that value indigenous rights, knowledge and perspectives, while de-colonising research frameworks attempt to use research processes and findings to break down cross-cultural discourses and asymmetrical power relationships (Scoones & Thompson, 1994a, Howitt & Stevens, 2016; Johnson & Madge, 2016). Empowering research in TEK involves the use of participatory research methods including indigenous methods, being methods that are not conceived and articulated from Western worldviews (Smith, 1999; Niezen 2003; Johnson & Madge 2016).

Critical hermeneutic-based research frameworks and participatory research methods, are accepted approaches to study TEK and have been used by social science researchers to 'give voice' to non-hegemonic social groups since the 1990s (Cornwall et al, 1994, Scoones & Thompson 1994a; KIVU, 2015; Berkes, 2018). Positionality of the researcher as an 'insider' or at least understanding of and empathetic to the views of the participant(s), is valuable to undertaking TEK research (Waters-Bayer, 1994; Berkes, 2012, 2018; Wijendaele 2014; KIVU, 2015; Howitt & Stevens, 2016; Johnson & Madge, 2016; Kindon, 2016) and Smith (1999) argues that genuine research into indigenous TEK must come from within the community to which it belongs. Because TEK is transmitted orally, often with ritual and protocol around who is privy to that knowledge, gaining insights into TEK requires the researcher to be in a position of trust with the participants and to have a level of background knowledge that enables them to appreciate the meaning and significance of the information they are told (Berkes, 2012; KIVU, 2015). Researchers also need sufficient 'insider' knowledge to be aware of potential implications for participants from how they present their findings (Waters-Bayer, 1994). Crang (2003, p.496) criticises research that divides positionality formulaically into "…'insider' (good but impossible) and 'outsider' (bad but inevitable)." However the issue may not be one of being either 'insider' or 'outsider' but recognising that research by 'insiders' can provide access to different information and insights. In Chapter Three, I discuss how my relationship of 'trust' with my research participants influenced the level of research participation and the nature of the information I was told.

Oral story-telling is emphasised in TEK research as an appropriate data collection method because it empowers participants and has synergies with indigenous forms of oral knowledge creation and sharing (Christensen, 2012 in Johnson & Madge, 2016; Wright et al, 2012 in Winchester & Rolfe, 2016). However a weakness of oral story-telling identifed by some scholars is the assumption that what is told is what happens (Wadley & Palmer, 2007; Berkes 2018). Cornwall et al (1994) suggest that indigenous farmers may simply repeat what they think the researcher wants to hear, or what they perceive is least damaging to their interests. Dahl (2015) argues that differences between talk and action may reflect a loss of cultural

practices as indigenous people adopt Western science Menzies and Butler (2006) and Berkes (2018) observe that land use is proprietary in most indigenous communities and suggest that participants may censor what they say because they do not want others knowing their resource and hunting grounds. For any of these reasons, some scholars argue TEK research should focus on action or the lived-in situation as well as discourse (Scoones and Thompson, 1994a; Wadley & Palmer, 2007).

In summary, the literature on TEK has been influential in this research but not from the viewpoint of arguing that non-indigenous intergenerational family farming culture is akin to indigenous TEK. As noted in Chapter One, that is a thesis in itself and is a secondary argument to the main focus of this research. However TEK literature provides established concepts and research frameworks which may be used to identify and articulate a community's farming culture, and to assess whether and to what extent that culture is a different way of knowing from Western science and planning paradigms.

Part Two – The New Zealand Context

2.5 Environmental Planning in New Zealand

This section discusses the literature on environmental planning processes in New Zealand, whether and how it acknowledges and addresses different ways of knowing, and how farming is understood within that literature. It builds on the potential 'triangle of environmental management in Canterbury' depicted in Figure 1 (p.11) by establishing the extent to which the intersections between environmental planning processes and Te Ao Maori, and environmental planning processes and farming have been explored in literature. Section 2.6 goes on to explore the literature on farmer-environment relationships and non-indigenous family farming culture in New Zealand.

Howitt (2001, p.5) suggests, "…the practices of resource managers are rarely subjected to critical evaluation outside of the contingencies of specific cases" and a quick precise of journals such as *Planning Quarterly*, the professional publication of the New Zealand Planning Institute, or a literature search of contemporary writing by planners in New Zealand, corroborates that view. Most contemporary literature on environmental planning within New Zealand falls within Hall's (1992) first category of literature on planning practice, and is focused on the efficacy of particular planning approaches to manage specific environmental issues, for example: freshwater (Memon, 2000; Jenkins, 2018, 2019; and Hughey et al, 2014; natural hazards (Saunders, 2017); indigenous biodiversity (Jay, 2000, 2005; Urlich, 2015; Ransom & Scott, 2019); or urban planning (Perkins & Thorn, 2000; Beattie et al, 2017; Lucca & Krieg, 2020). Also there is literature on planning methods and tools such as: plan implementation (Frieder, 1998; Jay, 1999; Berke et al, 1999); environmental impact assessments (Morgan, 2000; Lawrence, 2000); or Miller and Beattie's (2017) comprehensive guide on planning practice in New Zealand.

This 'planning practice' literature is underpinned by Modernist or Rational Planning Theory and assumes a Rational-comprehensive Planning Model will deliver appropriate environmental outcomes if sufficiently resourced and able to operate unencumbered. Any failure of planning processes to achieve desired environmental outcomes is attributed to one or more of a lack of information, resources or professional capability to enable the planning process to work as it ought; issues with legislation; or political influence

in the decision-making process which results in the triumph of economic values over environmental ones. For example Frieder (1998, in Jay,1999, p.469) describes the barriers to implementation of the RMA as:

> "[a] lack of advocacy for a strong environmental vision; inadequate data and monitoring; inexperience with the essentials of a fair process; reliance on a system of accountabilities that favours outputs over outcomes; [and a] lack of resources…."

Similarly, Klein's (2019) 'Assessment of New Zealand's Environmental Planning Model' identifies the use of a Rational-comprehensive Planning Model and the focus of the legislation on environmental effects as positive attributes. He suggests planning issues are the result of: failure by planners to properly execute steps in the rational planning process; ambiguity in the legislation; the need to enhance planning capability within local authorities; or the need to improve the quality of environmental information and procedures. Knight (2018, p.140) cites prominent New Zealand environmental lawyer and hearing commissioner Philip Milne suggesting that the failure of the planning process to address issues with freshwater quality in New Zealand was due to, "resource managers failing to identify the limits for development or at least failing to do so before the horse has bolted…." To that end, New Zealand's Minister for the Environment, the Honourable David Parker, has recently announced a review of the RMA with the aim of improving environmental planning processes around Māori values, freshwater management and other issues (Burkes, 2019, p.5). The review is couched on a presumption that planning outcomes are determined by statute, and that these issues can be addressed by amending the legislation. The review does not extend to any investigation of the limitations of Rational Planning Theory and the Rational-comprehensive Planning Model, or the ideological foundations which underpin New Zealand's environmental planning process as discussed in Section 1.2 (Chapter One).

As a generalisation, but I argue a fair generalisation, there is less New Zealand literature that fits into Hall's (1992) second category of critical analysis of the planning process as a socio-political phenomenon. Some New Zealand literature has examined the role of political, social and economic factors in influencing New Zealand's contemporary environmental planning process. For example Bürhs and Bartlett (1993), Britton et al (1992), Grundy (1993), Memon (1993), Memon & Gleeson (1995), Le Heron and Pawson (1996) wrote on the influence of neo-liberalism and new environmentalism on local government and environmental management in New Zealand. More recently, researchers such as Bührs (2000), Perkins and Thorn (2000), Barnett and Pauling (2005), Jay and Murad (2007), and Miller (2011) have reflected on the impact of these underlying influences when writing about the success of the RMA 10 or 20 years on. However, despite nearly 30 years since resource management law reform, comprehensive amendments to the RMA every few years, and decline across a range of environmental values from indigenous biodiversity (Ministry for the Environment, 2019) and freshwater (Ministry for the Environment 2011, 2014; Wright 2013, 2016) to urban planning (Ministry for the Environment, 2019); the literature leaves unchallenged the ideological foundations of contemporary environmental planning. As Keril (2009, in Sager 2017, p.108) suggests, in New Zealand planning literature: the limited role of the state in planning goes largely unquestioned; environmental issues are accepted as an 'economic versus environment' proposition; and Rational Planning Theory is accepted as 'the way' to do planning. Even literature on collaborative planning approaches does not explore the different theoretical underpinnings of Communicative Planning Theory from Rational Planning Theory or Neo-liberalist Planning Theory (see Section 2.3).

An exception to this generalisation is literature on recognising matauranga and tikanga Māori (Māori knowledge and practices) in environmental planning processes in New Zealand. That literature can be divided into Hall's two categories. In Hall's 'planning practice' category are papers which focus on matauranga and tikanga as a body of transferable knowledge which can be incorporated into environmental planning processes. For example, Berke et al (2002) identify barriers to incorporating matauranga and tikanga in environmental planning processes as: a lack of information and resources for Māori to partake in the planning process; ambiguous wording within the legislation; and the failure of local authorities to include appropriate provisions in their plans. In another example, Jay (2000, p.200) cites the Conservation Act 1987 as, "another important legislation that combines concern for Māori principles of resource management, with the conservation of natural and physical resources".

Researchers such as Roberts et al (1995), Cant (1995), Matunga (2000), Roberts (2002), Panelli and Tipa (2007), Tipa and Nelson (2008), O'Regan (2014) and Thompson-Fawcett et al (2017) argue for more fundamental ontological issues with incorporating matauranga and tikanga Māori into environmental planning processes. For example, Roberts et al (1995) argue that while the Conservation Act 1987 requires the Crown to give effect to the Treaty of Waitangi (s4), there is a fundamental ontological difference in the way that Māori understand and practice conservation compared with how it is defined in the legislation and practiced by the Department of Conservation in New Zealand. Roberts (2002, p.217) argues that the emphasis on tangible physical evidence for cause and effect in environmental planning processes means the process struggles to recognise the intangible aspects of the spiritual dimension of tikanga. The challenge is made more complex because, as Tipa and Nelson (2008, p.314) note, "…there is no one unified Māori perspective…and many complexities and contradictions exist…that must be acknowledged by resource managers."

Thompson-Fawcett et al (2017, p.177) argue that the undervaluing of Māori culture and associated environmental obligations and knowledge by Western forms of resource management, "…has removed Māori of their rangatiratanga (chiefly authority) over their use and management of their environment." In a similar vein, Matunga (2000, p.46) argues,

> "The planning orthodoxy in New Zealand needs to be destablished (sic)…and the reinsertion of tino rangatiratanga into New Zealand planning…empowering iwi to make final decisions about resources that are theirs including Māori land, minerals, waterways and harbours."

However, the literature is silent to date on whether and how such a system can or ought to be reconciled with Western environmental planning processes. For example, does tino rangatiratanga replace the current environmental planning process in New Zealand or is the suggestion one of dual environmental planning processes and, if the latter, how do they co-exist?

As noted in Chapter One, within New Zealand planning literature, agri-science is assumed to be the discipline which holds 'technical' expertise on farming and farmer-environment relationships. Farming is assumed to be a land use phenomenon centred on British-based arable and pastoral systems that were introduced into New Zealand by British settler families. While New Zealand Māori were the dominant farmers in New Zealand during the first half of the nineteenth century (Hodgkinson, 1856; Sinclair 1959; Eldred-Grigg, 1980; McLauchlan 1981, Bardsley, 2009) and some iwi are involved in contemporary

farming activities, Māori farming within non-indigenous farming systems is not well-documented in environmental planning literature. Literature on Māori TEK focuses on matauranga and tikanga associated with mahinga kai (food gathering) and other environmental management systems that have their origins in pre-European contact: for example, harvesting tīti (mutton birds) (Moller et al, 2010), the use of matauranga and tikanga to understand local weather patterns (King et al, 2008), classifying indigenous biota (Wehi et al, 2009), and managing freshwater (Tipa & Welch, 2006; Tipa & Nelson, 2007).

Farming is understood within environmental planning as a technical, economic activity - the commodity production of food or fibre, which is separate from and potentially conflicting with ethics of conservation and environmental stewardship. In Miller and Beattie's (2017) guide for planning practitioners, Miller (2017, p.191) describes the rural area as,

> "…a rural production area where resources such as land and water are used to produce marketable products…[and] those who live and/or work in rural areas must recognise this reality along with the need for collaboration and compromise to achieve an economically and environmentally appropriate outcome…"

In a reading used in an undergraduate planning course at Lincoln University, Knight (2018, p.145) claims that,

> "Ever since Europeans settled in New Zealand, there has been a clear delineation between private land, valued for production, and land set aside for conservation. On private land, few constraints have been imposed on how the land can be used….allowing for almost limitless exploitation."

In summary, within environmental planning literature in New Zealand farming is fitted into a Western planning system of problem definition and policy response centred around agri-science. That planning system is underpinned by assumptions that: the human-environment relationship is a subject-object dichotomy; economic development and environmental protection are conflicting goals; and Western agri-science holds all valid forms of farming environmental knowledge. Within this planning paradigm, those farmers who invest heavily in agri-science technology and comply with environmental regulations are assumed to be the farmers who have the best environmental management practices. Miller makes that exact argument, citing agri-science research (Browne et al, 2015 in Miller, 2017, p.193) to that effect. Therefore, how the farmer-environment relationship is understood within agri-science literature in New Zealand is pertinent to this research. Also pertinent is whether there are other understandings of farming which ought to inform the environmental planning process.

2.6 Farming - Environment Relationships in New Zealand

2.6.1 Understandings of Farming

From agri-science to art history, there is a vast body of academic literature that researches or relies upon research of an aspect of 'farming', be it in natural sciences, social sciences, or the arts. As Bardsley (2009, p.13) notes in her study of the influence of farming in New Zealand language, "the predominance of the rural world in New Zealand's social, cultural and economic history is long-established and undisputed." Despite the undisputed predominance of the rural world in New Zealand's history or maybe

because of it, the term ‘farming’ appears to be readily used within New Zealand literature, but rarely defined. This section begins by discussing different understandings of farming in New Zealand literature, before proceeding to discuss the literature on farmer-environment relationships. There is a broad body of literature encompassing some aspect of farming and, either directly or by association, assumptions about farmer-environment relationships in New Zealand. For the purposes of this research, I have identifed three categories of literature on farmer-environment relationships: agri-science; social science; and the writing of farmers themselves. Bardsley (2009, p.117) claims the language relating to farming in New Zealand has changed:

> “…farming is increasingly regarded as a commodity-related enterprise in a competitive global market rather than as formerly the major contributor to the country’s health and well-being.”

To that end, I suggest there are at least two understandings of ‘farming’ as a concept within New Zealand literature. Firstly, there is the understanding of farming as an economic activity – the commodity production of food or fibre. This understanding of farming, I argue, underpins agri-science.

Cornwall et al (1994, p.100) observe that

> “Conceptualizing agriculture as largely a technical activity obscures the social, cultural, personal and political dimensions of both rural farming practice and western agricultural science.”

Accordingly, a second understanding of farming in New Zealand literature is that of farming as a relationship between people and place. In this context farming is understood as a socio-cultural phenomenon that both shapes and is shaped by landscapes and communities: it is cultural knowledge, embedded, with beliefs, customs and mores, structures, language and practices. This latter understanding of farming underpins some (but not all) social science research on farmer-environment relationships in New Zealand. Depending on context, an understanding of farming as commodity production or an understanding of farming as cultural knowledge may be relevant: I am not suggesting one understanding is right and the other wrong. However, an issue arises when researchers assume one universalising concept of ‘farming’ as commodity production and fail to acknowledge how that assumption influences their understanding of farming, farmer motivations and human-environment relationships.

For the purposes of this research I have identified three categories of literature on farmer-environment relationships in New Zealand, based on the underlying assumption of farming as commodity production or a relationship between people and place. I have broadly labelled these categories: agri-science, social science; and farmers’ own literature. Each category is discussed below. As noted in Section 2.1, the literature is vast and I have focused on that which provides a New Zealand context for my research questions.

2.6.2 Agri-science and Farmer-Environment Relationships

My first category of literature on farmer-environment relationships is that which assumes farming is an economic activity – the commodity production of food and fibre, and the farmer-farm relationship is one of land as utility for that production. This literature is undertaken within positivist research frameworks

underpinned by an understanding of knowledge as conceptual and fixed. Literature in this category largely sits within the discipline of agri-science and I have labelled it as such but includes research in other sciences and social sciences which rely on agri-science for an understanding of farming. The term 'agri-science' is defined in the Oxford Dictionary as 'the application of science to agriculture' (www.lexico.com) and Curtis et al (2016) describe agri-science as dealing with food and fibre production. They identify agri-science as having three strands: research to more accurately define functional requirements; design and development of products to serve these requirements; and extension of this information to introduce improved techniques in agricultural industries. Within New Zealand, agri-science encompasses all three of these strands and is undertaken within land-based universities, and in public and private research facilities, and is taught vocationally at both secondary and tertiary level. Agri-science research in New Zealand is funded by a mix of public (government) research grants, industry levies paid by growers and farmers under the Commodities Levies Act 1996[8], and commercial agri-businesses.

Campbell et al (2009, p.95) describe agri-science research as, "…reductionist, technical, dominated by 'hard' science and strongly focused on the point of production…." Within this context, there is a body of literature which focuses on the environmental impacts of farming in New Zealand. It was founded on the work of local scientists and geographers in the late nineteenth and early twentieth centuries who observed soil erosion and land degradation particularly in more arid regions in New Zealand. Some of these scientists went on to work for the Department of Agriculture when it was founded in 1893 (www.tera.govt.nz) and exerted considerable influence over the assumptions about farmer-environment relationships which have underpinned much agri-science literature in New Zealand. From their observations, these scholars deduced causal relationships between farming and environmental effects and made pronouncements about farmers' attitudes towards environmental issues. For example, as early as 1868, amateur biologist John Buchanan (1868 in Peden 2011, p.238) wrote, "nothing can show greater ignorance of grass conservation than repeated burning of the pasture in arid districts, which is so frequently practiced." Similarly, Alfred Cockayne, a biologist with the Department of Agriculture, in 1910, and his father ecologist Leonard Cockayne, in 1919, both claimed pastoralists used fire indiscriminately (Peden, 2011, p.239). Geographer Lance McCaskill's (1937 in Dominy, 2001, p.9) claim that, "early runholders viewed their land solely as an economic commodity with no regard for conservation values" is cited in Chapter One, while North American Geographer Andrew Clark (1949 in Holland, 2013, p.1) suggested that,

> "There is in the South Island today a lack of any solid rural tradition, of any peasant-like feeling of love for the land…" and that farmers do not "…develop a strong resistance to practices leading to mutilation of the area in which they live."

Peden (2011, p.238) argues there is little evidence to support many of these claims. However, these assumptions about farming and farmers' attitudes towards the environment stuck.

[8] Industry levy bodies are organisations funded by farmers and growers under the Commodities Levies Act 1996 to undertake research, product development or marketing as set out in their five yearly plan. They include Dairy NZ, Beef and Lamb NZ and Horticulture NZ. These bodies are often involved in environmental planning processes relating to farming issues, at both national and local government levels.

Western agriculture generally, and farming in New Zealand, became more reliant on mechanisation and chemical inputs of fertiliser and pesticides post World War II (McLauchlan, 1981; Cumberland, 1981; Brooking et al, 2002). Consequently, the focus in the literature on the environmental impacts of farming broadened beyond soil erosion and pest management. Iconic works such as Leopold's 'The Land Ethic' (1966), Carson's 'Silent Spring' (1962) and Simmons 'The Ecology of Natural Resources' (1974) drew international attention to environmental issues associated with Western agricultural practices. They sowed the seeds for international movements that questioned the long-term environmental sustainability of Western agricultural and economic systems, such as the Brandt Commission's Report, 'North-South: A Program for Survival' (1980) and the Brundtland Report, 'Our Common Future' (1987). Section 1.2 in Chapter One describes how the concept of 'sustainable development' promoted in the Brundtland Report (1987) was incorporated into New Zealand's environmental planning framework as 'sustainable management'. In 1993, the Ministry of Agriculture and Fisheries produced a policy position paper, 'Sustainable Agriculture' which has engendered a focus in both agri-science and social science literature on 'sustainable' agriculture practices in New Zealand (Smith et al, 2007).

Agri-science literature on farmer-environment relationships in New Zealand today is premised on four fundamental assumptions: that farming is the commodity production of food or fibre; that expertise in farming production and knowledge of environmental impacts sits with agri-science; that most farmers, perhaps with the exception of organic farmers, are unmotivated to address the environmental impacts of farming (Fairweather et al, 2009); and that younger farmers are more responsive to environmental issues than older farmers (McCowan et al, 2012; Brown et al, 2015). Consequently, a role for agri-science is to develop technology and management practices to mitigate the environmental impacts of farming, and to pass these on to farmers. There is literature which focuses on farmers' environmental management practices and attempts to identify causal relationships between action and other factors: for example Fernandez (2017) looking at soil erosion management practices among different farmers; Brown et al (2019) looking at patterns and barriers to farmer uptake of new agri-science technology or land use change to reduce environmental impacts; and McCown et al (2012) and Nuthall (2017, 2018) considering factors that influence farmer-decision-making. This literature also includes research to define and measure sustainable agriculture. De Olde et al's (2017) paper identifying parameters for measuring sustainable agriculture typifies the assumptions about the role of farmers in sustainable agriculture identified above. The paper identifies "experts in sustainability assessment of agricultural systems" as agri-science researchers and agricultural policy analysts. Farmers are described in the paper as "stakeholders" (Ibid, p.1330).

Also, there is a body of agri-science literature which focuses on how to improve farmer engagement and uptake of agri-science. Much of this research focuses on Participation Theory; the notion that better uptake is achieved if agri-science researchers engage with farmers. Examples of this research include Allen et al (1998) writing on managing *Hieracium,* an invasive weed in the high country of the South Island; Robertson et al (2013) writing on techniques to engage dairy farmers in water quality improvements; and Paterson and Dewes (2011) writing on farmer uptake of Farm Environment Plans. Again, the underlying theme in this literature is that farmer engagement with agri-science is important to enable the transfer of knowledge from 'expert' to farmer. To that end, Brown et al (2016, p.319) suggest techniques regional councils can employ to pass information on environmental management on to farmers:

> "While regional councils undoubtedly hold important expertise about practices and technologies for better environmental outcomes, rural decision-makers in New Zealand give little credence to the veracity of the advice…."

Despite my criticisms, this literature is valuable to my research because it illustrates complexity and variability in farming systems, knowledges and practices. Undoubtedly, there are farmers in New Zealand for whom farming is an 'economic versus environment' proposition, and, undoubtedly, there are farmers in New Zealand who do (or ought to) rely on agri-science information to improve environmental management practices. My argument is that conflict arises when researchers and planners generalise those farming practices, motivations and knowledges to all farmers and all farming systems. In support of my argument, there is a body of literature which asks about (rather than presumes) farmers' attitudes to specific environmental issues. Such research uses a variety of methods from surveys and questionnaires to semi-structured interviews and the findings challenge the universalising of farmer-environment relationships in agri-science literature. For example, Jay (2005) researched dairy farmer's attitudes to protecting indigenous bush on farms in the Waikato. She concluded that for some farmers the farm is a place of business and for others a place of dwelling. Barry et al (2010) undertook a comparative study farmers' views on water quality in Taupo, New Zealand and Tomales Bay, California. They found that farmers in both catchments had strong environmental ethics and believed that impacts of farming on water quality ought to be addressed. In another example, Fairweather et al (2009) surveyed attitudes of organic and conventional farmers to environmental issues and found there was little statistical difference between the two groups. They concluded there is not a simple causal relationship between how farmers value environmental issues and whether they choose to farm in an organic or a conventional system. They criticised agri-science literature for,

> "…the direct and unqualified causal attribution of environmental and social degradation to conventional practices while establishing alternative practices be it framed as organic, local small-scale, agro-ecology...and so on, as the solution to such ills."

2.6.3 Social Science and Farmer-Environment Relationships

My second category of literature on farmer-environment relationships in New Zealand, is research which is based on an understanding of farming as cultural knowledge – the relationship between people and place. Research within this category is largely undertaken by social scientists within the fields of human geography, rural sociology, anthropology and environmental history. Dominy (2001, p.67) argues, "…few anthropologists and sociologists have attended to the ethnography of contemporary Pakeha New Zealand, and fewer still to rural New Zealand" but human geographers have written on the relationship between people and place in Canterbury and in New Zealand. For example, various contributors in Cant and Kirkpatrick (1983) write on the history of rural Canterbury and how people and communities have shaped and been shaped by farming. Britton et al (1992) and Le Heron and Pawson (1996), along with various contributors, write about the impact of New Zealand's process of state sector restructuring discussed in Chapter One on farming practices and on people's sense of place in rural communities. In Pawson & Brooking (2002), various New Zealand social scientists write about the transformation of natural environments and the creation of environmental histories in New Zealand, through the processes

of human settlement and interaction with place, while Egoz (2001) et al write on the role of farming landscapes as representations of a sense of place.

Anthropologists and sociologists have explored aspects of farming culture in New Zealand. American anthropologist Elvin Hatch (1992) undertook an early ethnographic study of the culture of three small sheep farming communities in South Canterbury, relating their understandings of social standing and determinants of farming ability to their distinct geographical communities. Morris et al (1995), Jay (1999) and more recently, Stock and Peoples (2012) researched the relationship between sheep and dairy farming cultures in various case studies around New Zealand. Morris et al (1997), Dominy (1990, 1995 and 2001), and Morris (2002) have studied high country farming communities in the South Island and, as part of that research, made observations about their participants' place-attachment relationships and the place-specific nature of their farming activities. As aforenoted, Dominy's (1990, 1995, 2001) work is not without controversy, which is discussed below. Morris et al (1997) also looked at conflict between high country farmers, environmentalists and bureaucracy in the Mackenzie Basin. New Zealand sociologist Rob Burton (2004) has also researched family farming culture, though focused more on British farming systems. However, his research draws useful comparisons, particularly in relation to intergenerational attachment to place, productivism, and the role of farming as vocation. While these researchers focused on the socio-cultural aspects of farming communities and practices rather than farmer-environment relationships per se, their research provides evidence of complexity and variance within family farming culture in New Zealand; evidence that challenges the notion of farming as a simple 'economic versus the environment' proposition.

Much of this social science research focuses on non-indigenous farming systems and communities. Recent research is exploring contemporary Māori farming activities, for example Le Heron and Roche's (2018) research on the emerging 'Taniwha Economy,' but as noted in section 2.5 above, comparatively little has been written about Māori farming in the late eighteenth and early nineteenth century in New Zealand. McLauchlan (1981, p.63) suggests that the readiness with which Māori adopted British agricultural practices may be due to ontological similarities between the association of agriculture with Christianity through the use of agricultural parables in the Bible, and Māori spiritualism associated with traditional mahinga kai such as kumara cultivation. However, beyond this suggestion by McLauchlan (1981), which is not supported by research, Māori farming from the early nineteenth century and any influence of matauranga and tikanga in shaping how it was done, has not been well-traversed.

Within this category of social science research on farming as a relationship between people and place, I have included research of social scientists with family farming backgrounds or who work closely with family farmers. Some of that research openly challenges assumptions about farmer-environment relationships and farmer knowledge that prevail in conventional agri-science literature. For example, Peden (2011), who worked as a shepherd on various runs in South Canterbury and the Mackenzie Basin, researched historic patterns of burning and farm production using historic farm diaries and other primary source documents. As aforenoted, he challenged the conventional agri-science position that early runholders indiscriminately burned and over-grazed their runs. Holland, a geographer who researched environmental awareness among early settler farmers, wrote about the catalyst for his research. He read the book by North American geographer Andrew Clark (1949) cited above:

> "I read these stern words while an undergraduate student in Christchurch in the 1970s, and they awakened memories of childhood visits to my paternal grandparent's farm four kilometres north of Waimate…That contrast between memory and scholarly argument established the fundamental questions that have driven my research for two decades and driven this book" (Holland, 2013, p.2).

Researching contemporary farmer-environment relationships, Kenny (2011) challenges the notion in agri-science literature that New Zealand farmers lack awareness of and skill to adapt to climate change. Based on eight years of engagement with farmers in eastern regions of New Zealand, he argues that "a comprehensive farm resilience picture has emerged" and that farmers are already reading multiple signals, including climate change, and responding to them (Kenny, 2011, p.441). Similarly, Smith et al (2007, p.33) looking at the management of environmental issues among North Island hill country farmers start their research stating,"…that farmers have a high level of appreciation of environmental issues is perhaps to be expected. After all they live close to the land and depend on it for their income."

Social science literature that assumes farming is a relationship between people and place aligns with my understanding of farming knowledge and practices. The presumption that farmers have knowledge of and expertise in place-specific environmental management, accords with my understanding of non-indigenous intergenerational family farming. In addition, research underpinned by contextual knowledge frameworks elicits different insights and understandings of farming and farmer-environment relationships than research undertaken within positivist frameworks. To that end, three studies are particularly pertinent to my research. First is the work of American anthropologist Michelle Dominy (1990, 1995, 2001) who undertook a community-based study of seven family farmers on the south side of the Upper Rakaia Gorge in mid Canterbury, New Zealand. Dominy (2001, p.2) applied, "…a theoretical and comparative perspective on the socio-political construction of place…place not as a setting but a physical space with cultural meaning". She suggested two aspects of identity signified these high country farming families:

> "relationship to a shifting physical geography, to land they call 'country'; and the significance of kinship networks and property transfer processes for preserving intergenerational continuity and neutralising place attachment" (Ibid, p.19).

Dominy's (1990, 1995, 2001) research attracted controversy because she described the place relationships of her research subjects as a 'settler-descendant indigeneity' (NZASA et al, 1990; Trigger, 2003). Also she presented some of her findings as part of a submission by the High Country Committee of Federated Farmers of New Zealand Inc to the Waitangi Tribunal in response to Te Kerēme – the land grievance claim lodged by Te Rūnanga o Ngāi (www.ngaitahu,iwi.nz; Dominy 1990, 2001). This action engendered debate among anthropologists about the role of research and researchers in assisting participant communities (NZASA et al, 1990). Setting aside the controversy, Dominy's (1990, 1995, 2001) observations of place-attachment relationships and farming culture among her participants provide valuable insights into aspects of non-indigenous intergenerational family farming culture in Canterbury. The insights gained from using a hermeneutic-based research framework and participatory research method influenced my choice of research framework, and Dominy's (2001) analysis reminded me of the importance of placing my research within the broader context of life-stories. My initial thought had been

to focus on narratives about how participants manage the environmental impacts of farming and adapt their farming systems to local environmental conditions. Dominy's (2001) research reminded me of the importance of understanding farmer-environment relationships in context. All aspects of the life-stories of my research participants are an expression of their family farming culture; the entire narrative is cultural knowledge. Equally, I was careful to avoid making comparisons between the place-attachment relationships and environmental management systems of my research participants and Te Ao Tahu. To do so would be to compare an understanding of Te Ao Tahu based on epistemological hermeneutics - understanding by doing, with an understanding of non-indigenous intergenerational family farming couched in ontological hermeneutics – understanding by being (Herde, 1999). In Chapter Nine, I discuss how the relationship between these two 'threads' of environmental management (as shown in Figure 1 (p.11)) could be explored using a credible research process.

The work of Holland et al (2002), Peden (2011) and Holland (2013) looking at historic archives to gauge the extent to which settler farmers considered environmental conditions in their farm practices challenges the notion in agri-science literature (noted above) that environmental awareness among farmers is a contemporary movement and not something considered by previous generations. To that end, it directly influenced my choice to use historic written narratives as well as creating oral narratives with current non-indigenous intergenerational family farmers, which will be discussed in Chapter Three. Holland's (2013) argument for the development of environmental knowledge among settler farmers in Southland over time is used in the analysis of my research. I argue for some parallels between the patterns of acquiring local knowledge Holland (2013) observed, and what may be occurring among non-indigenous intergenerational family farmers who have moved to Canterbury from the North Island to dairy farm more recently. Also, Holland's (2013) research helped facilitate the distinction in my mind between those who understand farming as commodity production of food and fibre and those for whom farming is a relationship with place that engenders increasing environmental knowledge of place over time.

The other body of literature that has been very influential in this thesis is the work of the Biological Economies Team (Campbell et al, 2009; Lewis et al, 2013; Le Heron et al, 2016; Pawson et al, 2018). As aforenoted, Campbell et al (2009) criticise agri-science research for its myopic focus on commodity production and make a case for understanding agri-food economies and rural land use through 'fresh eyes.' The Biological Economies Team's research argues that rural land use in New Zealand needs to move beyond the understanding of agriculture which underlies agri-science and,

> "…recognise the myriad economic, social, cultural and environmental factors that compose the human-environment relationship in rural areas" (Campbell et al, 2009, p.94).

They argue for a new term 'biological economies' to describe the, "..unique constellation of land-and-water-based resources, social values and ecological change within production landscapes" (Ibid, p.91) and advocate for research into agricultural questions and associated regulatory interventions that is informed by both biological dynamics and social values. Key to these new production systems is the blending of values centered on product quality, sustainable land and environmental management systems, and the provenance of landscapes and intergenerational family connections to place, in the development of niche products. The research explores a model of primary production that encapsulates much broader factors associated with farming than the production of high volume, low value commodity

products which has underpinned New Zealand agri-science and its economic and rural policy-making over much of the last century, and characterized political and public understandings of 'farming' (Lewis et al, 2013). The Biological Economies Team's research covers a broad ambit of rural production from industries which have emerged in response to the collapse of traditional commodity markets such as wool (Perkins & Pawson, 2016; Pawson & Perkins, 2018), pipfruit (Legun, 2016, 2018) and kiwifruit (Campbell, 2018); the reconfiguration, reorganisation and remarketing of other traditional products to meet changing consumer demand such as dairy (Le Heron et al, 2016; Le Heron, 2018) and lamb (Henry & Roche, 2016, 2018); to the emergence of new products such as boutique wine (Lewis & Le Heron, 2018) and rural tourism (Pawson, 2018; Perkins & Rosin, 2018). In each case, the research looks at the development and marketing of products of farming with its antecedent links to farmers and their passion for product quality, their place-attachment, and commitment to animal ethics and environmental stewardship

The Biological Economies Team's research is particularly pertinent to this PhD in three ways. Firstly, their use of Assemblage Thinking and enactive research to explore the complex relationships which constitute agri-food economies in New Zealand and to enact change, have helped shape my research methodology and analysis. Secondly, the research topic has parallels with the theme I am exploring in this research. The Biological Economies Team challenges conventional understandings of agri-food economies grounded in agri-science, and the separation of commodity production from farming systems and values. Similarly, my research challenges conventional understandings of farmer-environment relationships in agri-science and environmental planning literature and, to use a comparison, the merit of low value, high volume environmental regulation on-farm that has increasingly characterised New Zealand's environmental planning process over the last 30 years. I argue this conventional approach to environmental management is not reflective of farmers' values and does not manage environmental issues on-farm particularly well. However, the Biological Economies Team research is valuable not only as a complementary platform for farmer-led production, but in offering a potential way forward for farmer-led environmental management. A core component of the new biological economy is production and environmental management grounded in place-attachment relationships. The case studies in the literature (Le Heron et al 2016; Pawson et al 2018) showcase farmers highly motivated and very competent at creating and managing farming systems which integrate high standards of product quality, environmental management, and family and community values. In short, it shows economic and environmental values not as separate and conflicting objectives but as two sides of the same coin: economic production is sustained long-term because of its adaptation to and operation within the environmental parameters of place; and resource users are responsible for resource and environmental protection. It begs the question, is this the way forward for environmental management?

2.6.4 Writings of Intergenerational Family Farmers

My third category of literature on farmer-environment relationships within New Zealand is the writings of intergenerational family farmers themselves and those who work alongside them. Such writings are not usually considered academic literature in the sense of being undertaken within an accepted social science research framework. However the rich combination of familial histories, prose and poetry that encompasses this body of literature within New Zealand, provides valuable insights into non-indigenous intergenerational family farming culture expressed by those farmers. McLauchlan (1981, p.37) suggests that, with a few notable exceptions, little of New Zealand's nationally and internationally acclaimed

literature or art "…carried the scent of the farm." However family farmers have been writing about their experiences farming in Canterbury (and elsewhere in New Zealand) since arriving in New Zealand. Writings range from detailed scholarly studies of the natural or social history of place such as Guthrie-Smith's (1921) 'Tutira: The story of a New Zealand Sheep Station' cited in Chapter One *a*nd Burton's (1938) 'High Country'*,* to unpublished prose and poetry written purely for family histories or personal interest. This body of literature includes works written explicitly to explain or inform readers such as Mulcock (2001) 'Tussock Grasslands Our Heritage', complied for the South Island High Country Committee of Federated Farmers, or more recently Forrester's (2015) 'Farm in the Black Hills' commissioned by Rural Women New Zealand. Others are written by farmers for their own or other's pleasure such as Mona Anderson's (1963) 'A River Rules My Life,' David McLeod's (1972), 'Alone in a Mountain World', or Jim Morris' collection of poetry entitled, 'Different Worlds' (undated).

McLauchlan (1981, p.99) cautions against local histories as mostly

> "…written by people with roots in the area and therefore adulate the pioneer's courage, foresight, initiative and integrity…fleshing out history with anecdotal colour…"

and such works are not academic studies within a social science research framework. However, embellished or not, they are narratives which demonstrate understandings among non-indigenous intergenerational family farmers of their relationship with their environment, their sense of place, and their understanding of their place within place. To that end they form an important part of the literature pertinent to this research. For example, in a contribution to Paul Little's (2016) 'Love Letters to the Landscape,' Dr William Rolleston, a fourth generation Canterbury family farmer and former National President of Federated Farmers, describes his connection to Mt Arini:

> "This is the country that frames my landscape – an essential elemental touchstone of my life…The fifth generation are growing up on Blue Cliffs Station on the rolling downs some thousand metres below my vantage point on Mt Arini. Blue Cliffs our turangawaewae since 1879…It was at Blue Cliffs that my ancestors…would ride out in the early hours of the morning to begin the muster…It was on those slopes below in 1949 when exhausted after two days of rescuing stock and battling fire, grandmother Arini, on her knees, asked for help. Within a short period an incoming heavy fog quelled the fires…It was on those slopes that my grandfather, Dr Philip Woodhouse, chairman of the South Canterbury Catchment Board, came to realise the importance of water management and erosion control…" (Rolleston, 2016 pp206-207).

Rolleston's contribution reveals many things about his relationship with his environment: a sense of place born from both knowing and being Blue Cliffs; his grandmother named after the mountain under which she was born; intimate knowledge of both the natural and anthropological history and character of Blue Cliffs; a sense of both rights over and responsibility for place – he uses (perhaps misuses) the Māori term turangawaewae[9] to describe his familial relationship to Blue Cliffs. Dr William Rolleston and his grandfather Dr Philip Woodhouse are/were 'men of science' in a Western academic understanding of the

[9] Turangawaewae is described by Ngāi Tahu mana whenua as "the right to stand on a particular piece of land and to take part in any decisions concerning that land or the community associated with it" (Jolly, 2013, p.29). To have Turangawaewae one must have whakapapa – genealogical links to place, tracing ones ancestry back to the land and waters in place (Tau et al, 1990, p.3-3).

term. Both were medical doctors and Dr William Rolleston was awarded Distinguished Biotechnologist of the Year in 2009. Yet the knowledge of Blue Cliffs and farming Blue Cliffs, 'of the importance of water management and erosion control,' was acquired by living and working in the land.

In his poem 'To the Rakaia' Jim Morris (undated) expresses his attachment to place as he leaves Manuka Point Station in the Upper Rakaia Gorge. The last verse reads:

"…The years have left their mark it seems,

The rivers and the snow,

But my heart is fairly aching

As nears the time to go.

So here's a fond farewell to you

No matter where I'll be,

The old Rakaia Gorge will hold'

A fair sized part of me."

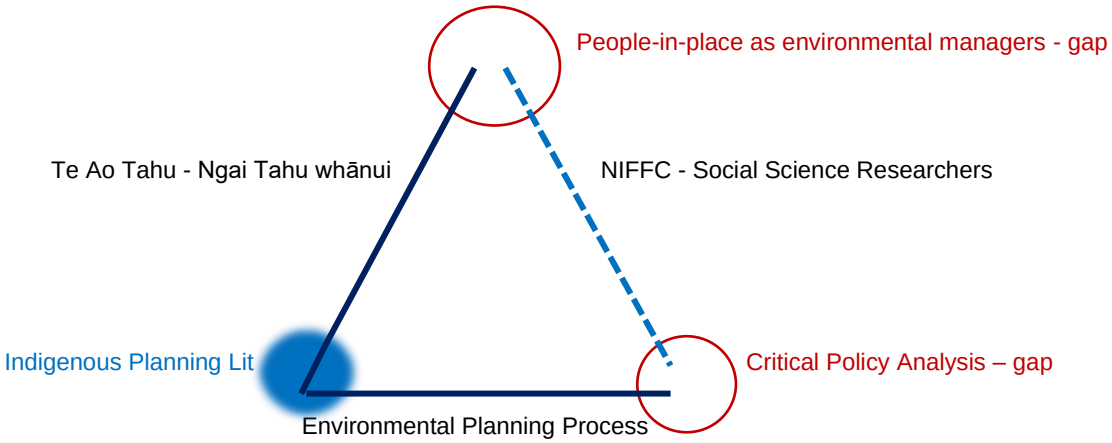
This simple poem expresses the pain of attachment to place and leaving place. They are not feelings associated with a relationship to land based on utility: rather an expression of emotional attachment.

The narratives of people who become involved in farming but are not intergenerational family farmers are also valuable in identifying characteristics of the farmer-environment relationship; from the writings of early colonial visitors to Canterbury such as Dr Hodgkinson (1856) and Samuel Butler (1861) through to more recent works such as Fernyhough's (2007) 'Road to Castle Hill.' Such writings provide insights from a participant-observer's perspective into the culture of non-indigenous intergenerational family farming in Canterbury. For example, Fernyhough (2007, p.139) refers to herself as an 'outsider starting in agriculture'. She starts her narrative saying, 'I did not realise how run down the station was…" (Ibid, p.14). As noted in Chapter One, I have observed that family farmers do not publicly criticize other farmers. This and other examples in Fernyhough's (2007) farming life-story as with Dominy's (1990, 1995, 2001) research, provide useful insights into the culture of non-indigenous intergenerational family farming in Canterbury from those who understand from seeing or doing, rather than being. Those observations are drawn on as part of interpreting and analysing the participants' narratives in Chapters Four to Six.

2.7 Conclusions

This chapter has placed my research argument in context: both in theoretical context and in the context of New Zealand literature. It has described the extent to which the triangle that creates my understanding of environmental management depicted in Figure 1 (p.11) is traversed in the literature and where the 'gaps' are. Those gaps are shown in Figure 5 below.

Figure 5: Literature on the Triangle of Environmental Management in Canterbury



In summary, Te Ao Tahu as cultural knowledge is well-expressed in academic literature by Ngāi Tahu researchers, and the intersection between Te Ao Tahu and environmental planning processes is traversed in Indigenous Planning literature in New Zealand. Non-indigenous intergenerational family farming culture and place-attachment relationships have been expressed in some social science research in New Zealand, but not in a comprehensive fashion that attempts to name and articulate a culture beyond small group ethnographic studies. Consequently that side of the triangle in Figure 5 is shown as a dashed line. Causes of conflict between non-indigenous intergenerational family farmers and environmental planning processes in New Zealand remains a gap in the literature, as shown by the red ring in Figure 5. This thesis attempts to address these two matters. The final gap shown in Figure 5 is at the top of the triangle, the potential for any alignment between Te Ao Tahu and non-indigenous intergenerational family farming culture. As aforenoted, this thesis does not attempt to address that gap, but Chapter Nine discusses how that research could be carried out and potential implications of such research for environmental planning in New Zealand.

Because planning is an applied discipline, it has borrowed theoretical constructs from other social sciences, particularly human geography, sociology and political science. Also, it has developed its own body of planning theory which sits in two schools: theories of planning practice or how to do planning; and critical policy analysis of the social phenomenon that is the public planning process. Within that context, researchers such as Dryzek (1982), Hall (1992), Herde (1999), Howitt (2001), Sandercock (1998, 2003, 2004) Bromley (2004) and Goldblatt (2004) champion the use of critical hermeneutic research frameworks to investigate conflict in policy-making and planning processes, and to change social conditions.

Planning is conflict management and planning theory concerns itself with both causes and resolution of conflict in planning processes and planning outcomes. Rational Planning Theory is underpinned by an understanding that conflict in land use is a result of competing social values – the ‘economic versus environment’ proposition. However conflict between planners and people-in-place resulting from different ways of knowing has been recognised in post-modernist planning theories since the early 1970s, including Transactive Planning Theory and more recently Communicative Planning Theory. These

theories seek to reconcile such conflict through dialogue/communication and the co-production of knowledge. However this response assumes two things. Firstly, that actors in the planning process and the planning process as an assemblage, are both ontologically capable of recognising and validating different ways of knowing. Secondly, that different ways of knowing, once they are recognised and validated, are reconcilable in planning processes and outcomes. In short, post-modernist planning theories assume a level of cultural uniformity among people in Western society and that this cultural uniformity is largely compatible with Western science and planning paradigms.

Indigenous planning and TEK literature offers a broader spectrum of understanding about conflict based on different ways of knowing. The focus on indigenous cultural knowledge means this literature challenges some of the 'taken for granted' universalising assumptions about knowledge and ways of knowing that underpin post-modernist planning theory, for example that all people share the same conceptual understandings of environment, knowledge and farming. This thesis is not making an argument that non-indigenous intergenerational family farming culture is a form of TEK, but the literature is pertinent to the research in two ways. Firstly, it provides concepts and methods to identify and articulate cultural knowledge among intergenerational farming communities, and to compare those ways of knowing with Western agri-science and planning paradigms, at a level not explored in conventional planning theory or critical policy analysis. Secondly, it offers two schools of thought on managing conflict between planners and people-in-place. There are scholars who argue that indigenous environmental management systems can be reconciled with Western planning and science through mutual learning and co-production of knowledge; and those who argue for the disestablishment of colonial planning and legal frameworks in favour of indigenous environmental management systems. However the literature is, as yet, silent on how such a transition to indigenous planning is executed, or how indigenous planning intersects with non-indigenous communities in cases where different ways of knowing and associated environmental management systems must co-exist.

While international planning theory recognises conflict between planners and people-in-place as resulting from different ways of knowing, there is a substantial gap within contemporary New Zealand planning literature in this regard. Human geographers, sociologists and political scientists have written on the impact of state sector restructuring and resource management law reform on environmental management in New Zealand and explored its ideological underpinnings. However, with the exception of literature on tikanga and matauranga Māori, most contemporary planning literature in New Zealand falls within Hall's (1992) first category of planning practice. It focuses on methods and tools to address specific environmental issues and is underpinned by an unquestioned acceptance of Rational Planning Theory and neo-liberalism; even when writing on the use of collaborative planning processes. Within this context, the environmental planning process looks to agri-science for an understanding of farming as a technical resource use, and agri-scientists as holding expert knowledge about farming and farmer-environment relationships. Therefore farming is understood to be an economic activity – the commodity production of food and fibre and conflict between farmers and planning processes as an 'economic versus environment' proposition.

There is a substantial body of social science literature within New Zealand that offers different perspectives on farming and farmer-environment relationships from agri-science literature. It starts from the premise that farming is a relationship between people and place. Researchers argue for evidence of place-attachment relationships, detailed local environmental knowledge, and adaptive farming systems, particularly among intergenerational occupiers of place. However this literature is not recognised as expert knowledge of farming within contemporary environmental planning processes, nor is the concept of different ways of knowing. Rather environmental planning in New Zealand appears to have fallen into Keril's (2009 in Sager, 2017, p.108) neo-liberalist trap of forgetting its ideological foundations. I argue the dirth of discussion on planning theory and critical policy analysis in contemporary planning literature in New Zealand has created a planning process unable to recognise and validate different ways of knowing and doing planning or environmental management. In short, they do not understand that they do not understand. This then takes us to Duncan's (2016) question: how is that conflict reconciled?

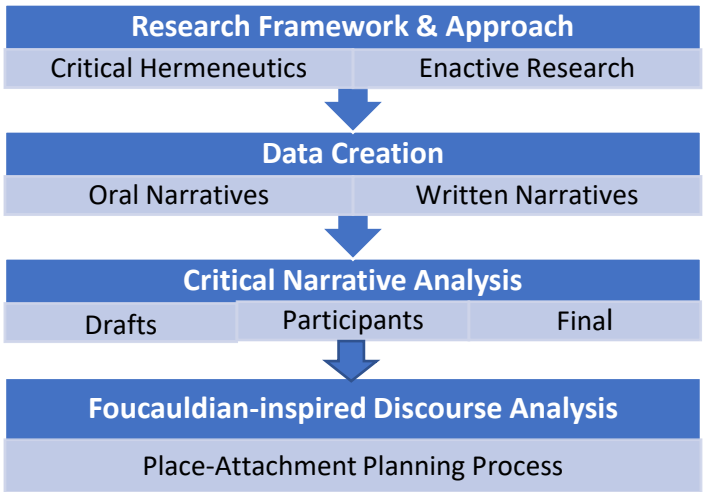
CHAPTER THREE Methodology

3.1 Establishing a Research Framework

Liamputtong and Ezzy (2005) suggest any social science research should begin with three questions: what is the theoretical framework within which the study is being conducted; what is the substantive issue being researched; and what are the desired outcomes of the research? This chapter discusses my research aims, research framework and any ethical issues. The term 'research framework' is used to describe the whole research process: assumptions about knowledge and knowing that underpin the research questions, research approach, and interpretation of the results; and the term 'research method' is used to describe techniques used for gathering and analysing data (Winchester et al, 2016).

The substantive issue being researched is whether conflict between non-indigenous intergenerational family farmers and environmental planning processes in Canterbury is an 'economic versus environment' proposition or tension between environmental management systems underpinned by different ways of knowing? The desired outcomes of the research are: to identify and articulate non-indigenous intergenerational family farming culture and associated environmental management systems in a way that gives it academic legitimacy; and to effect policy change and improve environmental outcomes through reconciling conflict between non-indigenous intergenerational family farmers and environmental planning processes. Considering the research topic and my positionality, the research framework must be grounded in social-constructionist realities. Secondly, to ensure credibility, the research framework needs to be recognised in academic literature as an appropriate framework to investigate cultural knowledge among a social group (in this case non-indigenous intergenerational family farmers) and to critically evaluate planning processes. Thirdly, I need a data-collection method with which my participants will feel comfortable. Fourthly, the research framework needs to elicit new insights about farmer-environment relationships from those gained within a positivist framework. Finally, given my positionality, the research framework must value subjectivity in the researcher. The research process is summarised in Figure 6.

Figure 6: Research Process



3.2 Critical Hermeneutics and Enactive Research using Narratives

As discussed in Chapter Two, hermeneutics is grounded in an ontology of knowledge and knowing as contextual and varied. Hermeneutics acknowledges there are independent, knowable phenomena, but our knowledge of them is always and already shaped by cultural and social constructs (Rickman, 1985). A hermeneutic research framework accepts shared realities and understandings between people but not a single reality or way of knowing that is conceptual, fixed and undisputed (Herde 1999, Liamputtong & Ezzy, 2005). A critical hermeneutic research approach is appropriate for this research for two reasons. Firstly, as discussed in Chapter Two, critical hermeneutic-based research frameworks are accepted frameworks for critical analysis of public policy and planning processes and are used in TEK literature. Secondly, hermeneutics is an appropriate framework for researching questions about culture among a social group and critical hermeneutics is an appropriate research framework to effect social change (Dryzek, 1982; Herde, 1999).

A hermeneutic research framework is compatible with my positionality in this research because it assumes every participant in social science research and every researcher bring assumptions and a history or tradition of understanding into the research (Herde, 1999). Therefore, a researcher attempting to be disconnected from their research does not result in 'unbiased' research; rather it may result in less credible research than that which openly acknowledges, accepts and reflects on subjectivity (Graham 1997; Winchester & Rolfe, 2016; Johnson & Madge, 2016). In addition, a 'lived experience' by the researcher is valuable in creating new knowledge and understandings (Waters- Bayer, 1994; Berkes, 2012 & 2018). However, reflexivity needs to be considered within each step in the research process and I have endeavoured to do this in interpreting and analysing the narratives in Chapters Four to Seven, as well as in my evaluation of the data against the research questions in Chapter Eight and my conclusions in Chapter Nine.

The assumptions about knowledge, language and subjectivity which underpin hermeneutic-based research frameworks enable the employment of different research approaches; in particular, an enactive research approach. Enactive research has its origins in Merleau-Ponty's (1962, in Haskell et al, 2002) concept of 'embodied action' which challenges the notion of information as an independent entity and enquiry as attached to a particular event or concept. Embodied action is the 'ungrounding' of knowing, centred on the notion that knowledge is created and changed on each interaction. In 'The Embodied Mind', Valera et al (1991) argued for an approach to research based on a view that cognition is not an ultimate foundation that exists beyond its history of embodiment (Haskell et al, 2002). Therefore, enactive research assumes knowledge is groundless, it does not exist as a separate entity waiting to be uncovered by the researcher. Researchers and participants create knowledge in the research process with the intent of enacting social change (Lewis et al, 2013). Enactive research approaches are used by some social science researchers to understand complex situations and relationships, to create understanding (Lewis et al, 2016). This research lends itself to an enactive approach because as a researcher I do not have a position that I wish to prove or disprove. Rather, as outlined in Chapter One, I have observed a complex situation of conflict at the interface of farming and the environmental planning process for which I have not found a satisfactory explanation within established literature.

Participatory action research methods are a crucial component of critical hermeneutic research frameworks and enactive research approaches. In a true participatory action research, researchers and participants work together on all aspects of the research (Herde 1999; Pratt 2000; Liamputtong & Ezzy 2005; Kindon, 2016) but Kindon (2016, p.352) argues valuable insights can be obtained by incorporating participatory methods into aspects of the research process, for example, creating data and analysing findings. My research participants have not been involved in negotiating the research topic or research framework but I have used participatory action methods in creating and interpreting data. Participants have told their farm life-stories, in their own words; and as individuals and in groups they have reviewed and discussed my interpretation of their narratives.

Herde argues (1999, p.1) that story-telling is a form of participatory action research: participant and researcher converse, the product of which is an oral narrative. Story-telling empowers participants because they control both what they say and how they say it (Herde, 1998; Dunn, 2016). As such, oral story-telling is a recommended method for researching TEK in indigenous communities (Johnson, 1999; KIVU, 2015; Wright et al 2012 in Winchester 2016, p.9) and I know from my own personal experience that family farmers enjoy telling stories about their farm and farming life. I have chosen to ask participants to tell me their farming life-story rather than their environmental-management story for two reasons. Firstly, as noted in Chapter Two, cultural knowledge needs to be understood within context. Secondly, as noted in Chapter Two, one of the criticisms of oral story-telling methods is the assumption that what the researcher is told is what happens (Scoones & Thompson 1994a; Wadley & Palmer 2007). Asking farmers to tell me their farming life-story rather than telling me about their views on environmental management may reduce the potential for differences between 'talk' and 'action' because I am being told about the 'action.' By going on-farm to create the narratives I am seeing farming in action, or as Freudenberg describes it (1994, p.125): "By…walking with the farmer-experts though their territory…[I] give local people the chance not only to show… but also to explain the rationale behind what they do."

There are differing views among academic researchers as to what constitutes a narrative, but Riessman (1993) suggests most academics accept a narrative as being a discreet unit detachable from surrounding discourse, that has a beginning, middle and end. I decided to use a combination of two forms of narrative: oral narratives created by conversations with non-indigenous intergenerational family farmers; and existing written narratives penned by non-indigenous intergenerational family farmers in Canterbury. Written and oral narratives can be merged in textual analysis so the methods are complementary (Winchester et al, 2016). Using both forms of narrative enriched my data and added credibility to the research. Oral narratives tend to be limited to the stories of one or two generations, whereas written narratives can span longer timeframes: the written narratives analysed for this research date from Hodgkinson (1856) to Forrester (2016). Written narratives provide a more transparent evidential link between the data and my interpretations. While I recorded and transcribed the oral narratives, as part of my research ethics I committed to not making those transcripts publicly available without the permission of the participants. However, the written narratives are publicly available. Finally, the written narratives are not created for this research process, so any shared understandings between the oral narratives and written narratives may add credibility to my interpretations. However as Holland (2013, p.4) notes, one cannot assume that "everything which is written [or said] is important or that everything which is important is written [or said]." For this (and other) reason(s) I enacted feedback sessions with the participants to discuss the accuracy of my interpretation of their narratives (see Section 3.4 below).

3.3 Creating Data

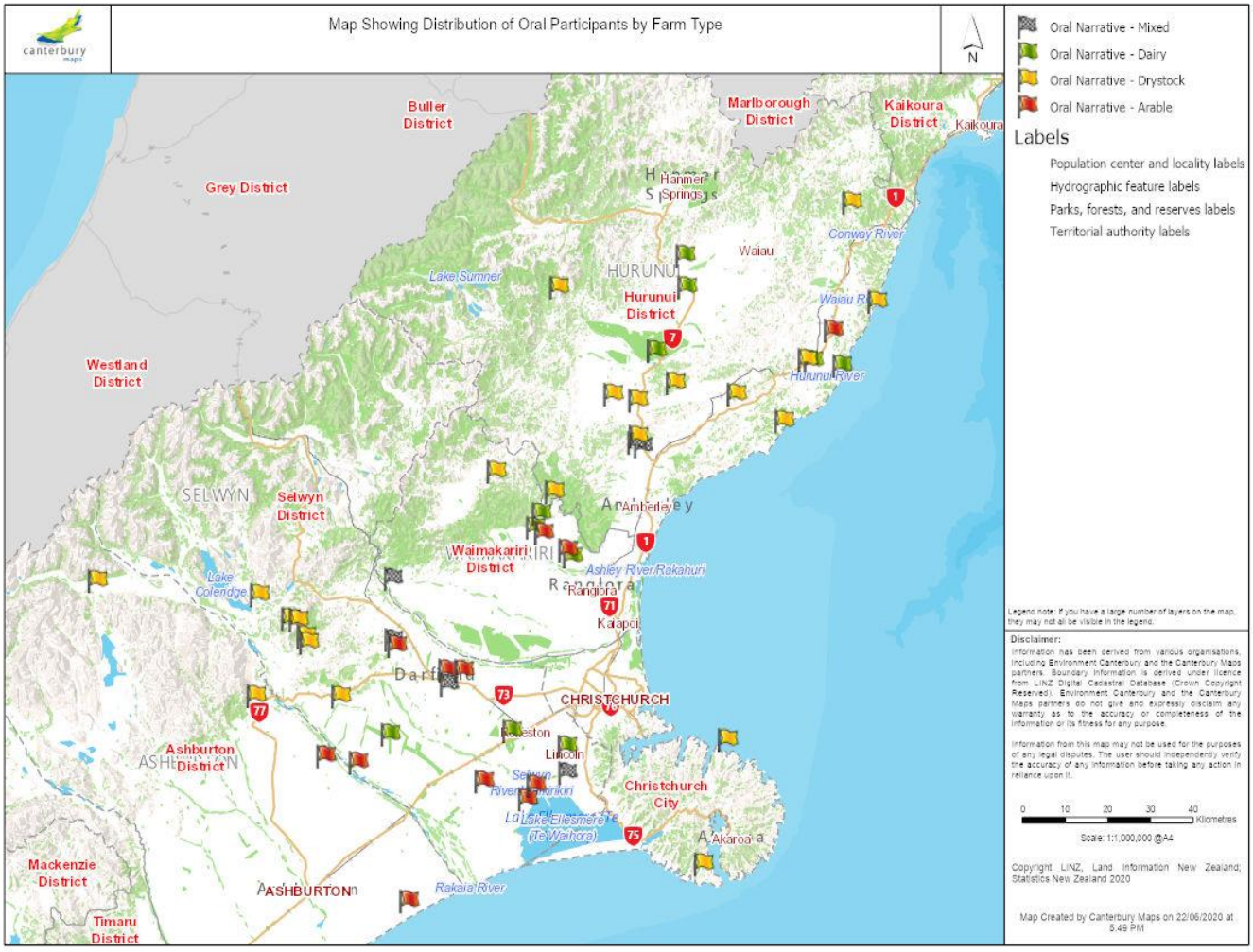
Having decided to create data using oral and written narratives of non-indigenous intergenerational family farmers, the first step was to define the criteria for what constituted a non-indigenous intergenerational family farmer. As discussed in Chapter One, I focused my research on this cohort of farmers because it is through my knowledge of non-indigenous intergenerational family farming in Canterbury that I have questioned the notion of conflict between farmers and the environmental planning process as a simple 'economic versus environment' proposition. In addition, I am borrowing concepts and methodology from TEK literature to establish whether intergenerational family farming is cultural knowledge. As noted in Chapter Two, one of the hallmarks of TEK is that knowledge is experiential and intergenerational transmitted from generation to generation orally and practically.

As noted in Chapter One, I have defined my research cohort as non-indigenous farmers because irrespective of their ancestry, they are farming families who have acquired and held their land within a British-based land ownership system and farm it using crops, livestock and land husbandry techniques introduced to New Zealand by predominantly British missionaries and settlers. I defined 'intergenerational' as those who have had at least three generations farming in this way. Ideally, the participants' family have farmed within Canterbury and on the same property for at least three generations and this is the case for most participants. However I wanted to ensure a reasonable portion of the participants were dairy farmers, because the environmental impacts of dairy farming in Canterbury is at the heart of the 'economic versus environment' proposition identifed in Chapter One. To meet this requirement I had to include participants who have moved to Canterbury from the North Island. In each case, those participants are younger siblings who did not had the opportunity to buy into the family farm at home. In hindsight, that choice enriched my research because there are common themes among all the narratives, as well differences based on longevity in place and on the type of farming participants undertake (arable, drystock or dairy).

As discussed in Chapter Two, Section 2.3, I wanted to compare my findings with Dominy's (2001). observations from her community study group of seven high country farming families located in one area (south side of the Rakaia Gorge). I wanted to see if there are shared characteristics of land attachment and social kin networks among a larger and more diverse group of non-indigenous intergenerational family farmers: more diverse geographically in their situations across Canterbury, more diverse socially in their kin networks, and more diverse technically in their farming activities. Due to variations in geography, climate and soil types within Canterbury province, a variety of irrigated and dryland farming occurs on a range of country: drystock (sheep, beef and deer), arable (cereals, vegetables and seed crops), viticulture and horticulture, and dairy farming; on plains, coastal hill country, foothills and high (alpine) country. I aimed for a participant group illustrative of this diversity in family farming in Canterbury. Also, I made a specific category for high country family farmers, to see if there were factors specific to their narratives which more closely aligned with Dominy's (2001) findings. Also, as noted in Chapter One, my participants needed to be residing on the family farm, with at least one member of the family farming as a full-time occupation.

The next step was to select participants (for oral narratives) and written narratives. To select participants I used what Patton (2002) describes as purposive sampling to identify farmers that met the selection criteria. Firstly, they needed to meet the criteria of non-indigenous intergenerational family farmer described above; and secondly, in accordance with TEK research protocols, the participants needed to know me well enough to be comfortable sharing their story. Potential participants were identified from within my own networks, which given my connections in the family farming community in Canterbury, my career in environmental planning, and my role in Federated Farmers, are reasonably extensive. Fairweather et al (2009, p.437) claim a typical response rate for farmer surveys in New Zealand is around 31-33%, and Dominy (2001) records the difficulty she had in getting an entrée into the farming community for her research. Similarly, I anticipated having at least 50% of those farmers I approach refuse to partake given both the time commitment involved and the 'sensitivity' around farming and environmental issues in Canterbury (and New Zealand generally). Therefore, I identified a tentative list of 100 families to approach, in groups of five at a time. In my case, only one farmer I approached did not agree to participate and he said, "I will do it, because it is you."[10] Figure 7a is a map showing the location of the participants by farm type.

Figure 7a: Map Showing Distribution of Participants by Farm Type

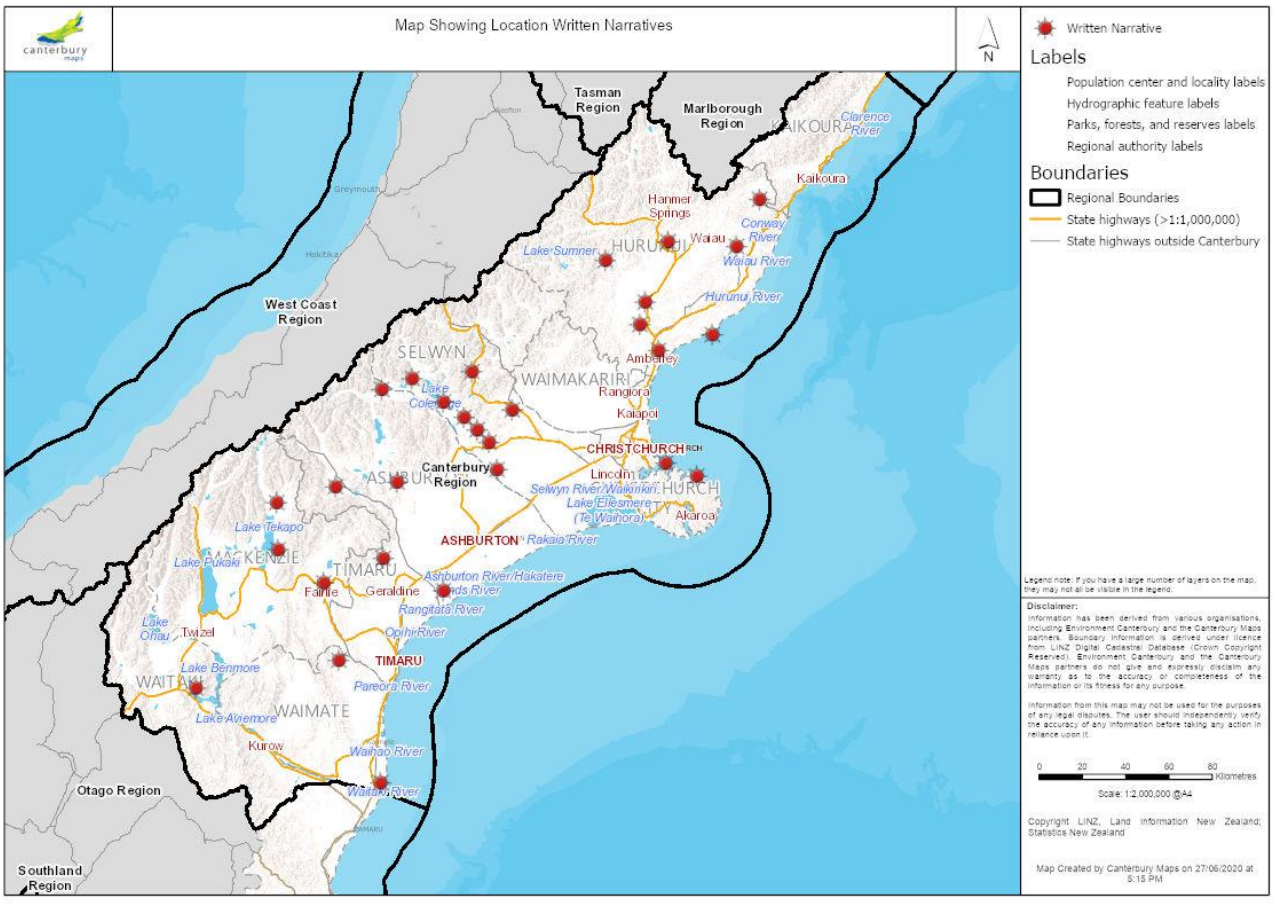


[10] In that case, I told that farmer he did not need to partake in the research.

I was surprised at how quickly participants made themselves available to have the conversations, usually within the same week I contacted them. I followed up with the participants in the feedback sessions on the reasons for their willingness to participate in my research. Their willingness was due to a combination of two factors: that the researcher is someone they know and trust; and the topic, which participants said was worthwhile and they wanted to support. F06 told me about a previous research experience where he felt his 'words were twisted', "…but I trust you." Participant F15 summed up the response when he said, "I knew that I could say what I think and it would not be used against me."

Written narratives were identified using the same criteria for non-indigenous intergenerational family farmers as the oral narratives. Obviously, the second criterion (knowing the researcher) was not relevant but the author needed to be part of the farming family. I wanted to make sure the written narratives were the words of the family farmer not an interpretation of the story by a third party. However, for pragmatism, I accepted that in the case of published works there may have been an editorial influence over the words. Written narratives were sourced largely from New Zealand history sections of libraries in Canterbury, as well as some self-published narratives I sourced from my farming contacts. With the written narratives I was limited to selecting from existing texts and consequently dairy farming families are under-represented compared with sheep and beef, high county and arable farming families. However, I was able to include a reasonable geographic spread of written narratives across Canterbury as shown in Figure 7b below. A list of participants (coded) and written narratives is included in Appendix One.

Figure 7b: Map Showing Location of Written Narratives



In selecting participants and the written narratives, I did not consider gender, age or ethnicity of the participants for several reasons. Firstly, following TEK research protocols, it is up to the participant to determine who tells the narrative and who is present when they do so (Johnson, 1992; KIVU, 2015). Secondly, the family farm unit is usually composed of more than one person, with mixed gender and age groups, though Hatch (1992) and Morris (2002) have both noted distinct gender roles within their ethnographic studies of farming communities. To that end, there are many ways in which to "cut the cloth' of this research and limited space with which to explore themes, so I chose to explore research questions relating to exploring, naming and articulating non-indigenous intergenerational family farming culture as an assemblage, for the purpose of exploring conflict with environmental planning processes. However, there is ample scope within the research data to explore nuances and differences in the participants' farming culture based on age, gender, farming activity or other factors. Therefore, in coding my research results, I added age and farming activity cohorts for this purpose. However, many of the participants partook in the research as family units, so it was not simple to classify them by gender, or even age if more than one generation partook. Dominy (2001, p.5) records a similar issue when she tried to look at gender studies in her research and being told by the women participants, "…we all work as a family up here." Finally, I have not made any distinction based on ethnicity. As noted in Chapter One, participants are primarily of Anglo-Celtic heritage though some have mixed Anglo-Celtic and Māori heritage. However, I have labelled their farming systems and culture 'non-indigenous'. I did not include tribal farms owned by Te Rūnanga o Ngāi Tahu or papatipu rūnanga in my research.

In creating the oral narratives, I followed protocols identified in academic literature for research into TEK using oral story-telling (Johnson, 1992; KIVU, 2015; Dunn, 2016; Johnson & Madge, 2016). These protocols are centred on ensuring participants have control in the research process. They include:

- Ensuring research occurs in an environment comfortable for the participant, ideally on their 'home' patch;
- The participant decides who is the appropriate person(s) to tell the story, what information is told, how it is told and whether it may be recorded;
- Participants have a right to see how the data is used and to determine which data may be used;
- Participants have the right to turn the recorder off, to ask for information to be deleted or amended, or to withdraw from the process at any time;
- Transcriptions remain anonymous and data is reported in aggregate form; and
- Participants have the right to see and discuss the findings and analysis before the research is completed, and that discussion forms part of the final analysis.

Potential research participants were contacted by email with an introductory letter explaining the research and advising I would follow up with a phone call. In most cases participants replied by email before I called, and I negotiated arrangements to meet with the respondent. If I did not receive an email reply, I made a follow-up phone call and took the lead from that conversation as to whom I was to negotiate with. Interviews took place on the family farm. When I met my research participants they were re-briefed on the process and consent forms were signed. A copy of the information given to each participant in the research is included in Appendix Two. In particular, the letter emphasises that the participant has control

over the process and the information, anonymity of their information, and the right to withdraw at any time.

My intention was that the participants tell their farm-life story from which I would distill examples of their environmental management practices, environmental knowledge, and experiences with environmental planning processes. Therefore I created a detailed check list of topics I wanted to discuss. I undertook a pilot study to create an oral narrative with an intergenerational family farmer I knew very well, so I could anticipate some of the information the process should elicit. Pilot Conversation One lasted approximately 45 minutes. While the conversation yielded a lot of information about the farm and the participant's farming knowledge and practices, some of the information I was anticipating would be included in the oral narrative was not. The conversation was very structured, dominated by my questions and short responses. I was distracted by my checklist and missed cues to develop a conversation point especially if it was steering away from topics on my checklist. My pilot study was not creating an oral narrative, rather I was trying to 'cut to the chase' of the data I thought important, and as a result, creating an interview using repeatable questions to generate data that could be categorised into a predetermined framework.

Drawing from both TEK literature and Dominy's (2001) work, I realised I was forgetting that my participants' farming stories are cultural knowledge and ought to be told in context of their life-story; that every component of the narrative contributes to understanding. With that insight I reread Riessman (1993) and Herde (1999) and tried a second pilot conversation using the one open-ended question – *'tell me about the farm?'* Pilot Conversation Two was completed with the same participant as Pilot Conversation One. I thought if I used the same participant, I might be able to eliminate any differences in the conversational experience which may result from talking with a different participant. Pilot Conversation Two lasted nearly 160 minutes. Information I was expecting did come up in the conversation, but also information that was not known to me. The conversation did not follow the order of topics I had in my checklist; it was told in a different way. The participant's story was centred on recurring themes of livestock health and farming ethics, and the participant's interest in high country landscapes. Life-events were ordered against the timing of significant weather events, and the farming story was the participant's life-story. All the topics in my checklist were included in the story but in different patterns from my 'geographer's' checklist.

This conversation gave me the first indication of both the value of story-telling over structured interviews in generating data and the value of critical narrative analysis, considering how the story is told. The approach I adopted for subsequent interviews was based on that in Pilot Conversation Two. Participants were asked an opening or orientation question, *'tell me about the farm?'* Every conversation differed but I soon found underlying themes were repeating themselves across the narratives. I kept my checklist but to use as George and Stratford (2016, p.195) describe, an 'aides-memoire', which I referred to at the end of the conversation to see if there were any major topics not traversed. In all cases, the topics in my checklist had found their way into the conversation at some point. As Riessman (1993, p.54) observes,

> "…the impulse to narrate is natural …and it is almost inevitable that asking [open-ended] questions will produce narrative accounts provided interviewing practices do not get in the way."

When I started the conversations with 'tell me about the farm?' the reaction was usually hesitation followed by a comment such as, "what do you want to know" or "where shall I start?" When I explained participants could start wherever they liked they seemed pleasantly surprised to have the freedom to tell their story, their way. Some participants said, "stop me if I am going off-track" and F10 asked whether it would be easier if I asked him questions "to avoid my irrelevant ramblings." When I explained it was his 'irrelevant ramblings' I wanted his wife said, "I hope you brought your sleeping bag!" Once participants understood they could just tell me their story, conversations were frank and free-flowing. I tended to be the one ending the conversation because I was conscious of how much of the participants' time I had taken. Recorded conversations lasted from 45 minutes to over four hours per participant, with a mean of 94 minutes. All participants supplemented their oral narrative with photographs, maps or written material about the farm and usually a farm tour. Consequently, my interaction with participants involved at least a half day every time, and always an invitation to lunch or dinner. Every participant remarked how much they enjoyed the interaction. There is no way of verifying whether this approach has resulted in different insights than a structured interview. However, as discussed in Chapters Four to Eight, this research has elicited insights and explanations of the farmer-environment relationship and conflict between participants and environmental planning processes within Canterbury, that I have not read in conventional agri-science or environmental planning literature. Also, the insights and findings in this research are consistent with observations about farmer-environment relationships and farming practices described in literature using hermeneutic research frameworks.

Some academics note that issues can arise when a researcher is both 'insider' and 'outsider' or participant and observer (Crang, 2003; Winchester et al, 2016; Dowling, 2016). Given my dual roles as both a non-indigenous intergenerational family farmer and an environmental planner, I was not sure if participants would regard me as an 'insider' (family farmer) or an 'outsider' (academic or environmental planner); though the level of participation and the information elicited in the process suggest I was 'trusted.' Personal matters were candidly discussed, and while one or two participants said, "you won't record that bit will you" (and of course that information is not in the transcripts) I was surprised at the number of participants who told me quite intimate details of their lives, presumably trusting my judgement in how that information is used. Also I wondered whether participants might 'sugar-coat' their experiences with environmental planning processes given my background as an environmental planner. However the free and frank discussion of their experiences suggests that was not the case.

The final step in gathering data was to determine how many narratives I would create and analyse. In hermeneutic research frameworks, the number of participants is not important from a statistical analysis perspective: the aim of the research is to analyse meaning in specific context not to create general representativeness (Valentine 1997; Robinson, 1998; Herde, 1998). However, Riessman (1993) notes that one of the criticisms of narrative analysis is that sample sizes are often small and unrepresentative for comparative analysis. Liamputtong and Ezzy (2005) argue for a diverse range of data sources and

participant groups to help ensure rigour, while Dunn (2016) recommends seeking out diversity of opinion and not relying on one informant as that can mask tension or controversy. I was also mindful that my interpretative community includes people whose knowledge of research processes will be centred on positivist research frameworks. As such, they may regard size of the participant group as an indicator of the credibility of the research. However the benefits of a larger participant group need to be considered alongside the volume and diversity of data generated from a larger number of narratives, and how a large volume of data can be presented, interpreted and analysed within a thesis.

In my research plan I had a target of 50 oral narratives and 20 written narratives. I was mindful, though, of Herde's (1999) argument that the appropriate number of participants is determined by the findings; as a researcher you know when you've 'got the picture'. Similarly, Stratford and Bradshaw (2016) argue that the richness of information and its validity and meaning relate more to the researcher than the sample size. In the end I worked with 51 participants to create 52 oral narratives (including my two pilot studies) and analysed 30 written narratives; a total of 82 narratives (see Attachment One). While every narrative was different, when analysing my data I identified common themes and shared understandings of farmer-environment relationships and farming. Those common themes and shared understandings were apparent after analysing around 30 narratives. However I coded and analysed the remaining narratives to add depth and confidence to my insights, and to have a rich pool of data from which to draw examples. Using both oral and written narratives as data sources added depth to my findings and if I was to reduce the volume of data generated, I would lessen the number of narratives analysed rather than confining myself to only oral or written sources.

3.4 Critical Narrative & Discourse Analysis

Oral and textual narrative analysis are accepted qualitative research methods in human geography (Crang, 2003; Winchester & Rolfe, 2016). Reissman (1993) describes narrative analysis as using the medium of narrative to identify, analyse and understand individuals, usually within a cultural context or setting. Positivist research frameworks focus on existential analysis – analysing what is said or what is done, assuming a universal understanding of words and actions. Research within a hermeneutic framework is critical analysis - seeking to understand words or actions in context; what is said or done, how it is said or done, and why (Braun and Clark, 1998). In critical narrative analysis, the narrative is not a means to elicit data, but the data per se and illustrates how narrators impose order on the flow of experiences to make sense of events and actions in their lives. Riessman (1993, p.64) notes that "narrativization assumes a point of view" and individuals will construct different narratives about the same event. Cronon (1999) makes a similar point: the difference between a chronology of events and a narrative is that a narrative offers interpretation and people can offer different interpretations of the same data depending on their underlying ontological assumptions. The aim of this research is not to find a universal truth about conflict between non-indigenous intergenerational family farmers or all farmers and environmental planning processes, but to offer another perspective about potential causes of conflict from a universalising 'economic versus environment' proposition.

Discourse analysis is the analysis of patterns of discourse. It is widely used as an analytical tool in social science research in hermeneutic frameworks across a range of disciplines including environmental policy and planning, and within TEK literature. Jorgensen and Phillips (2002) describe discourse analysis as a tool to understand the struggle between different knowledge claims as a struggle between different discourses which represent different ways of knowing. Critical discourse analysis investigates and analyses power relationships in society and formulates normative perspectives from which a critique of such relationships can be made, with an eye to possible social change. There is no universal view of what constitutes discourse or how to undertake discourse analysis (Jorgenson & Phillips, 2002; Sharp and Richardson, 2010). Discourse analysis in environmental policy and planning research usually focuses not only on textual sources, but the entire planning process as a complex entity of ideology, strategy, language and practice (Jacobs, 1999; Sharp & Richardson, 2010). Discourse analysis is used to explore the policy and planning process per se; to assess how understandings of environmental issues and solutions are developed, and how policy conflicts are routinised, negotiated and enacted (Hajer, 1996; Sharp & Richardson, 2010).

All approaches to discourse analysis are based on a shared understanding of language as contextual and meaning, and that discourse creates and changes society. There are different forms of critical discourse analysis which reflect different underlying assumptions of social construction and the drivers of social change. Fischler (2002) and Sharp and Richardson (2010) describe Habermasian-inspired Discourse Analysis which is underpinned by Habermas' theory of communicative action as an agent of social change, and Foucauldian-inspired Discourse Analysis that focuses on changes in power structures as the drivers of social change. Foucault's work occurred in two phases: an 'archaeological phase' which focused on the rules by which statements in society are accepted as meaningful and true, and a 'genealogical phase' when he focused on the role of power structures in shaping society by determining what constitutes valid knowledge (Foucault, 1972 in Jorgenson and Phillips, 2002, p.13). A Foucauldian-inspired Discourse Analysis considers social constructions and power relationships surrounding knowledge. It can be used in critical policy analysis and TEK research in decolonising and post-colonising research frameworks (Cornwall et al 1994; Howitt & Stevens, 2016). Foucault (1972 in Waitt, 2016, p.295) argues the key to discourse analysis is reading, listening and looking at your text with fresh eyes and ears, "…to be critically aware of the ideas that inform a researcher's understanding of a topic." There are debates within academic literature about whether there should be templates for undertaking Foucauldian-inspired Discourse Analysis. Researchers who do suggest a template or methodology for Foucauldian Discourse Analysis, focus on the need for critical reflexivity of each stage of the research process and the role of the researcher within it. Researchers should consider who holds knowledge and where it comes from; be aware of rule-bound statements and discursive structures that reinforce dominant understandings of knowledge; and be mindful of ambiguities, silences and contradictions in texts (Wood & Krooger, 2000; Waitt, 2016).

For this research, I undertook a critical analysis of the narratives in Chapters Four to Seven. However, in Chapter Eight I attempted a Foucauldian-inspired Discourse Analysis of the underlying power and knowledge structures in the environmental planning processes described in the case studies in Chapter Seven. Foucauldian-inspired Discourse Analysis is usually employed in the study of, "…hidden histories and geographies of disadvantaged people and minority groups " (George & Stratford, 2016, p.191). For

that reason, initially I questioned the appropriateness of using a Foucauldian-inspired Discourse Analysis for researching non-indigenous intergenerational family farmers – a group who, historically in Canterbury, are not marginalised or disadvantaged. The participants are well-educated, of higher socio-economic status, have good access to resources and Miller (2011) argues they are politically influential within local government. However, the question of why some forms of knowledge and power are revealed in the environmental planning process and others are hidden, and why some forms of knowledge are valued and others are not, is pertinent to this research. To that end, lack of recognition or validation of the participants' farming and environmental knowledge in the environmental planning process, arguably, is more intriguing than if they were a marginalised or disadvantaged social group whose lack of influence could be more readily explained through lack of resources or political influence.

The first step in undertaking a critical narrative analysis was transcribing the oral narratives into text. I chose not to use transcription software for this task for two reasons: firstly, a simple technical reason that I recorded the interviews on a 'Microsoft Surface 1' which I later found was not compatible with most transcription software programmes. Secondly, transcribing the conversations manually provided another opportunity to familiarise myself with the narratives and to understand them in context. For that reason, Dunn (2016) advocates for researchers transcribing their own interviews. As aforenoted, my research yielded large amounts of data which I needed to organise in a way that could be interpreted and afforded some value beyond being a collection of individual stories. My data needed to be coded for both organisational and analytical purposes. I established what Cope (2016, p.87) refers to as 'setting codes': a personal log of each narrative to enable me to track data to participants. Each text was given a code number that consists of the data shown in Figure 8.

Figure 8: Coding of Participants

Participant Number	Sector	Age Cohort	Generations Farming in Canterbury
F1-52 oral narrative	D – dairy	1: 20-40 yrs	1: 2 generations
F60-80 written narrative	L – livestock (sheep, beef, deer)	2: 41-60 yrs	2: 3 generations
	A – arable	3: >60 yrs	3: >3 generations
	H – high country	4: family conversation	x/1: x = generations family farming /1 = first generation in Canterbury
	M – mixed farming		

A participant with number F23A23 is participant number 23, an arable farmer, aged 41-60 years, and their family has been farming in Canterbury for more than three generations. A '/1' after the last number indicates the family have moved to Canterbury this generation, and the participant was born and raised on a family farm in another province. Most arable farmers run some livestock as an integral part of their arable system, but in Figure 8 they are recorded as farm type A. Mixed farming, or farm type M, describes participants who run separate farming systems on the same property, for example F15M23 run arable and deer, F11M33 and F31M23 run dairy and sheep, and F44M33 run cattle and a vineyard. F18 and

F45 are arable farmers who own dairy farms as 'investments' but identify themselves as arable farmers and so are classified as A. The purpose of the coding is not to create repeatable measures or statistics; rather it is to uncover the extent of shared understandings between participants, including understandings which may relate to age, types of farming, or longevity in place. Any insights along these lines are particularly useful in exploring some of the notions about farming practices in agri-science literature noted in Chapter Two, for example, whether older farmers are less focused on environmental management than younger ones, or dairy farmers are more focused on economic values than other farmers.

The analysis of the texts was undertaken at two levels: a manifest content analysis – the existential analysis; and a delineation of underlying meanings – the critical analysis (Dunn, 2016). In analysing the narratives, I did not use word recognition software because it did not seem compatible with a hermeneutic research approach. Hermeneutics views language as contextual, as meaning, whereas using voice recognition software assumes words convey universal and repeatable meanings. Therefore I read and coded the narratives manually against themes and sub-themes. Also, I recorded the way in which the stories are told; common words, descriptions or attitudes expressed by the participants and silences or things which are not said. Manually analysing the narratives meant I was able to consider both content and context, including interpreting word order, silences and pauses, tone, and the way information is grouped in the story; all of which help in understanding. Also, manually coding the data meant I was able to establish a framework for organising and analysing the data as I was transcribing the narratives. Letting the narratives lead the analytical framework was important: from my experience with the Pilot Studies, I was aware participants may tell their stories in different ways from those I anticipated.

Figure 9: Analytical themes and case studies

Themes:
1. **Relationship between intergenerational family farmer and farm**: • How the family farm is understood as place; home; and identity • Goal of the intergenerational family farmer to remain in place • Describing the intergenerational family farm
2. Understanding the activity of farming: • Philosophy of farming • Role of economic values in farming • Role of environmental values in farming • Role of socio-cultural values in farming: vocation, family, community
3. Farming knowledge and decision-making: • How participants gain and transfer their knowledge of place and farming place, including the role of intergenerational knowledge & agri-science • Patterns and influences in decision-making on farm
Case studies:
4. Managing conservation sites on farm
5. Managing effects of farming on freshwater

The written narratives were read and sentences or passages that were relevant to the research topic copied and organised under the themes and sub-themes shown in Figure 9. These themes are drawn from the key indicators or sign-posts for identifying different ways of knowing borrowed from TEK literature and shown in Figure 4 (Chapter 2, p.30). How participants relate to the family farm and how they understand farming are linked to how they know human-environment relationships and nature. The theme of how farming knowledge is acquired and transferred explores epistemologies of knowledge and knowing. It also tells about the influence which agri-science and environmental planning processes have in farm decision-making. The two case studies are: the management of sites with significant conservation and indigenous biodiversity value on farm; and the management of the effects of farming on freshwater. Both of these issues were identifed in Chapter One as being pivotal in developing my understanding that conflict between non-indigenous intergenerational family farmers and environmental planning processes may have more complex origins than a simple 'economic versus environment' proposition.

Once the analysis was complete, I needed to present my information. Because I chose narratives as my primary data source I had a large and disparate amount of data. This created two challenges: firstly, what to include; and secondly, how to present the information succinctly while demonstrating an evidential link between the data and my interpretations. Riessman (1993) argues that narratives are a self-representation, a person's cultural knowledge and should be analysed in the whole, not 'snippets' taken out of context. However for research to add value, data ought to be produced in an, "...analysed and condensable form that offers value beyond the immediate recording" (Riessman, 1993, p.2). My question was, how do I present a useful and contributing analysis from the huge volume of data I generated, without losing the authenticity I gained from choosing this research method? As noted in Chapter Two, Crang (2005, p.225) criticises the dominant approach in qualitative human geography of, "…bringing back data and representing It (sic) nicely packaged up with illustrative quotations." But even 'packaging up data with illustrative quotations' requires a degree of interpretation about how the data is to be packaged and which quotations are cited. Also, I was concerned that if my 'snippets' became too 'snipped' the context and colour of the data would be lost. To that end, Menzies & Butler (2006, p.11) criticise reports on TEK research as, "…more often like scientific reports and remove the traditional knowledge from cultural and ecological context."

Cornwall et al (1994, p.112) suggest, "there is a danger in drowning in pluralities. If many different versions of knowledge are produced, then no single version can produce a truth". They conclude the most important way to address this dilemma is to be upfront with how the data is interpreted. Riessman (1993) argues persuasiveness is added to narrative analysis when claims are supported by evidence from informants' accounts, and alternative interpretations of the data are considered. Given this is original research, evidential links between the participants' narratives and my analysis are important for credibility. Therefore, despite Crang's (2001) criticisms, I have included tables of 'illustrative quotes' from the narratives and, in some cases, additional, 'illustrative quotes' are included in appendices.

To add further credibility to my research, I sent my draft narratives to the participants for feedback. Two documents were sent: a 15-page summary of the key points of my interpretation and a longer 60-page draft of what would become Chapters Four to Eight of this thesis. My draft documents focused on the themes identified in Figure 9 (p.61) but were written in bullet-point fashion for ease of reading (bearing in mind comments made by some participants about the length and complexity of environmental planning documents). Participants were asked, "have I told the story, right?" Also I had questions on specific issues that emerged from the stories, which I included in the draft report for feedback (in red italics). Participants were invited to join one another in an organised forum to discuss my interpretations, or they could provide feedback to me directly. I included this step in my research process for three reasons. Firstly, it is a crucial part of the enactive research process that I discuss my interpretations and understandings with my participants and try to generate further understanding through discussion. Secondly, as Holland (2013) noted in relation to his research with farm diaries, I cannot assume that all that is written or said is important and anything that is not written or said, is not. Thirdly, several participants asked if they could see what other participants said. One of the issues Dunn (2016) notes with focus group research is the possibility of one or two personalities dominating the discussion, and I was aware of that possibility. However as Valentine (1997) notes, the aim of the research is not to find representative, unbiased results but to understand the individual experience of the participants.

Representatives from 42 participant families attended one of four feedback sessions held at Coalgate, Waipara, Cheviot, and Christchurch in July 2019. I received feedback via email or phone calls from another five participant families. The feedback from the participants was that my interpretation was an accurate portrayal of intergenerational family farming culture as they understand it. In an email (dated 23rd July 2019) F47 said*:*

> *"*I have read through your work (albeit quickly!) and was most impressed at the depth of understanding - both in rural people's minds and that which you have managed to capture and articulate. My father has also read your work and had the same reflections. We both felt you had a very accurate grasp on our own thoughts and also that of the rural world we know and love as a whole. Congratulations, this is no small achievement."

In a phone call (29th July 2019) F05 said that the research process and findings explained for him things that had been puzzling him for 50 years about, "why we do the things we do," and in his phone call F03 told me, "you've hit the nail on the head, I really enjoyed reading it." Participants were keen to know the next steps: now their story is written how can they make it heard? One participant in the Waipara feedback session (23rd July 2019) bought a friend along to the discussion, and the friend asked if she could send my draft document to Environment Canterbury right then, as she felt as an environmental regulator they needed to better understand family farmers. In the Christchurch feedback session, F11 commented on the value in having the story told in a formal academic research framework to give it credibility. At the Coalgate feedback session F47 said that with the effort that had gone in to producing the research, "…it can't be left to sit on a dusty shelf somewhere, Lynda, you must tell our story!"

3.5 Credibility & Reflexivity

An important aspect of researching in hermeneutic-based research frameworks is establishing credibility in the research, and there are differing views among social science researchers on how to do this. Some social scientists advocate for establishing 'rigour' (Baxter & Eyles, 1997; Liamputtong & Ezzy, 2005). Others argue that establishing 'rigour' too closely resembles the ontological assumptions behind positivist research frameworks, and that researchers should focus on establishing credibility and trustworthiness by using critical reflexivity throughout the research process (Hay 1998; Nicholls 2010, Johnson & Madge, 2016; Winchester et al, 2016). However Crang (2003, p.498) cautions against the overuse of reflexivity to the point where the research, "…loses the rites of the field and the voice of the Other for the art of the prose and the examination of the Self." Other researchers suggest credibility may be established through the acceptance of the results among the interpretative community (Jiggins, 1994; Mishler 1990 in Herde 1999, p.6), though I argue that may depend on who the interpretative community is and whether the research fits within or challenges the ontological assumptions that community makes about valid forms of knowledge. One of the challenges for this research is that environmental planners in New Zealand are largely schooled in normative-rational planning approaches underpinned by Western science and Modernist Planning theory.

Dowling (2016, p.300) notes, "…there are no hard and fast rules for establishing credibility in social science research…" and that the conduct of ethical research depends on how researchers deal with their unique relationships with participants, peers and other parties. Stratford & Bradshaw (2016) argue that strategies for ensuring trustworthiness need to be included and employed in the research design and reporting, and that sharing the research findings or text with the research community is an important part of that credibility process. In short, ethical research is achieved through a code of conduct rather than a set of prescribed actions. Following these arguments of Dowling (2016) and Stratford and Bradshaw (2016), I have chosen to demonstrate credibly in my research in two ways. Firstly, I have documented my conclusions and reflections throughout the research process, identifying areas where my positionality and subjectivity may have influenced the research process and my understanding of that process. However I have tried to heed the warning of Crang (2003, p.498) and not become reflective to the point of my research becoming a thesis of 'Self rather than the Other.' Secondly, I have considered my research against Liamputtong and Ezzy's (2005) measures for theoretical, methodological and interpretative rigour, below. Irrespective of arguments about whether 'rigour' is an appropriate term for social science research within a hermeneutic framework, such an assessment provides a demonstrable check for credibility in research design, documentation and reporting.

Using Liamputtong and Ezzy's (2005) criteria, I believe my research has theoretical rigour because the research problem, method and the concepts employed complement one another. A critical hermeneutic research approach is an accepted social science approach in critical policy analysis and TEK, and is particularly appropriate for my second research question which is seeking to improve a social condition by reconciling conflict in environmental planning processes. An enactive research approach is appropriate within a critical hermeneutic research framework, and for researching a topic which is complex and not well-understood; where the aim of the research is to create fresh understandings and enact change. The use of oral and written narratives as data sources and critical narrative analysis and

a Foucauldian-inspired Discourse Analysis, are appropriate research methods to create and analyse data within a critical hermeneutic-based research framework. They are recognised research methods in academic literature on critical policy analysis and TEK.

I believe my research has methodological rigour because an explicit account is included of how the research was conducted and conclusions are not over-generalised or unsubstantiated. This chapter provides a detailed account of the methods I have used to collect, code and analyse data and the use of feedback sessions with participants to further validate my interpretations. I have demonstrated that my interpretation of my research findings is robust and logical in four ways. Firstly I have transcribed oral stories word for word to limit the degree of researcher interpretation in converting oral stories to text. Secondly, my coding framework was devised from the texts as they were transcribed, not predetermined and the data 'massaged' to fit the framework. Thirdly, coding of my data and the use of illustrative quotes provide an evidential trail between my interpretative narratives and the original texts. Though I used my analytical framework to organise my data into themes and sub-themes, I wrote my interpretations from reading and analysing the participants' narratives in their entirety, not using word-recognition software or other technology to summarise the data. Finally, throughout the analysis I have reflected on my own perspective, taking care to make sure I do not focus on narratives that support my own experience and understanding of non-indigenous intergenerational family farming and ignoring narratives that do not. I purposefully chose participants who farm in different locations across Canterbury and in different farming sectors to ensure a more diverse group of participants than my own community of dryland hill and high country farmers.

In terms of Liamputtong and Ezzy's (2005) measures of validity: my research has measured what it purported to measure: the existence and nature of non-indigenous intergenerational family farming culture; and causes of conflict at the interface of farming and the environmental planning process. The measurement strategy I used is accurate – the farming life-stories of non-indigenous intergenerational family farmers recorded in their own words, which I argue is more reliable than a structured interview or participant-observation because it allows the participant to explain their actions and the meaning behind their actions, in their own words. To move the research findings from a collection of individual narratives to insights of a shared reality of knowable phenomena requires interpretation of the narratives. Credibility in completing that interpretation is established in three ways: the 'audit trail' between the narratives and my interpretations; reflectivity in the discussion; and the participants' feedback on the draft narratives.

CHAPTER FOUR Relationship to the Family Farm

"*Times have changed and so also have the ethics of yesterday, but one thing remains the same, the love of the land, born and bred in man (sic) from the beginning of time…"*
(McRae, 1968, p.117).

4.1 Introduction to Intergenerational Family Farm as Place

A key sign-post for different ways of knowing depicted in Figure 4 (p.30) relates to understandings of the human-environment relationship. Western science is characterised by an understanding of the human-environment relationship as a subject-object dichotomy while in many indigenous cultures it is understood as one of kinship or even singularity – they are the land (MacGregor, 2004). In the quote above, non-indigenous intergenerational family farmer Shona McRae (1968) describes a farmer-farm or human-environment relationship based on attachment: 'a love of the land', which she argues is born in people. This chapter provides an interpretation of relationships between participants and the family farm, based on the oral and written narratives analysed for this research and affirmed by the participants in the feedback sessions described in Chapter Three.

Various social science researchers in New Zealand have interpreted the farmer-farm relationship. For example: Hatch (1992, p.128) describes the farmer-farm relationship as a bounded system, with farmers forming a reference group based on their status as landholders and farmers in a particular location; Holland (2013, p.191) borrows Relph's (1976) description of authentic place-making, leading to, "…a feeling of being native-rooted in a particular part of the world"; and Pawson (2018b, p.17) describes farmer-farm relationships on Banks Peninsula as, "…practices that have a rootedness in the landscape." Dominy (2001) borrows from Rogers and Sahan (1983 in Dominy, 2001, p.125) to describe the farmer-farm relationship among her participants as, "inextricably tied to each other and permanently fixed in space." Burton (2004, p.207) makes a similar observation of farmer-farm relationships among family farmers in the United Kingdom, suggesting, "..it is the land which allows the expression of identity for the farm family." However the extent to which that form of place-attachment is shared more widely among non-indigenous intergenerational family farmers in New Zealand has not been explored, nor has the farmer-farm relationship been explored within the context of explaining conflict with environmental planning processes in New Zealand. The aim of this chapter is to identify and articulate the relationship(s) between participants and the family farm. Two themes are explored in this chapter: firstly, the conceptual and emotive understanding participants hold about the family farm as place and their motivators to farm place; and secondly, how participants describe the family farm.

Before exploring the theme of farmer-farm relationships there are three cornerstones of non-indigenous intergenerational farming culture expressed in the narratives, which need to be articulated and analysed because they contextualise and colour all the themes explored in Chapters Four to Seven. The three cornerstones are: the participants' understanding of different forms of farming; the relationship between the family farm as place, farming as an activity, and acquiring farming knowledge (being the three themes explored in Chapters Four to Six); and the way participants tell their farming life-stories depending on what they farm. Each cornerstone is discussed in this section. Section 4.2 interprets and analyses how

the participants understand the family farm as place; and Section 4.3 explores how participants describe the family farm. Conclusions and reflections are drawn in Section 4.4.

Figure 10a: Descriptions of Family Farming as Attachment to Place

Narrative	Description of Family Farming as Attachment to Place
F06L43	"It is a family farm… which my grandfather bought in 1924...I am very attached to this place. I was born here and I will die here."
F07L42	"It's that longevity with the dirt, what do they call it – turangawaewae?"
F12L23	"We'll do anything to look after our land and we'll fight to keep things as we see as right and fight for our livelihood."
F16L42	"Yes it is [turangawaewae] and you automatically do what is best for the land."
F17A42	"For us it's a lifestyle, it's our heritage, a history…."
F18A33	"We have taken the view we are here for the next generation and possibly the generation after that, if they are interested…."
F20D22	"They talk about a man's house is his castle, but a family farm is a family castle. It is often intergenerational…so they will fight tooth and nail…."
F28L23	"The attachment to land is something I can't actually say. My worst day would be if I was alive and this farm was sold... You just can't duplicate that time, that connection. I don't see that I own the property, I just have the use of it for my lifetime…and it's my job to hand it on in a better condition than I got it…"
F31D43	"You need the tie of the land you are on….it can't be a financial tie it has to be an emotional tie… You have to be super-invested in the land, to be wanting to make a difference, wanting to stay."
F33A23	"I'm fifth generation, it was 1860s, we had our 150 year [anniversary] two years ago. But the farm I'm on is on my mother's side…and three generations. It's a good feeling to know your family has been here, that history is there but you can become a bit too sentimental…."
F37M33	"You know Ngāi Tahu will talk to you about their relationship to the land, to the mountains and the lake…Pākeha families are much the same. They identify with their family farms and their backgrounds and heritage, as you well know…The farm I am on was purchased by my great grandfather in 1904 but the family has been farming in the area since 1865…it is the place where I stand."
F40A23	"We came here in 1994…After having farmed in one area for 100 years we have been a little more mobile since but hopefully we will put roots down here again…I go very much by the concept of turangawaewae so that's what we are trying to do…".
F42H23	"We just know it and love it and are probably too attached to it really, but we also know that if we sell it the family will most likely never own a farm like it again…it's a love-hate relationship, there's quite a lot of pain that goes with it too, but it is love."
F43A23	"I'm third generation on here. We've been here for about 80 years, but we do have a connection through marriage to the original settlers…which is nice to know and I think it affects the way you look at things and the way you develop the property. It's not just a connection to the land, it's a connection to the people that were on the land before you…."
McLeod	"Certain places…exert on you an inexplicable attraction, almost as if you are tied to them by some event beyond your knowledge or understanding " (1974, p.177).
Roberts	"To many of us, these hills and valleys twixt the Hurunui River and the sea are more of a love song than an epic in grazing land. Every peak and every hollow has, at some time, vibrated to a passing touch, leaving a memory of endearment" (1946, p.7).
Stapleton-Smith	"The rest of the farm has pleasant valleys…but these great rock faces hold the heart as well as they hold stock" (1990, p.i)

Figure 10a lists examples of how the participants describe family farming and Figure 10b how they describe 'corporate farming.' Family farming is described by the participants as distinct from 'corporate' farming in three ways. Firstly, it is centred on an attachment to place. Dominy (2001, p.122) observes that some of her participants describe their attachment to place as turangawaewae and several participants in my research 'borrow' the term (defined in Chapter Two) to describe their relationship with

place. Secondly, the goal is to remain in place. Participants refer to their long-term or intergenerational relationship to place. Thirdly, farming is a physical, cognitive and emotive interaction with place, they are as F07 says, 'in the dirt.' Setting aside arguments over appropriateness of using the term turangawaewae, the pertinent point for this research is that the participants all describe a concept of farming which is based on a long-term or intergenerational attachment to place and they distinguish that model of farming from other ways of knowing and doing farming in Canterbury. The family farm is not a medium on which to undertake a generic activity called farming.

Figure 10b: Descriptions of Corporate Farming

Narrative	**Corporate Farmers & Farm Developers**
F06L43	"Corporate farming to me is an oxymoron. To me farming is a long-term, on-going process, it's not about the short-term dollar."
F07L42	"Family farmers have that attachment to the land or even if they do not have that family attachment [they] have a strong environmental ethos. Then there are other farmers who are, you need to tick the box sort of thing, that tends to be in the corporate area."
F16L42	"[Corporate farming] you have somebody for whom the farm is an investment and that's a completely different set of circumstances [from family farming]."
F17A42	"…you are dealing with a different entity when you're dealing with a family farm to the corporate farmer...not what type of farmer you are but your connection to the farm you are on."
F24D23/1	"The drive by corporate farmers coming to Canterbury and Southland has driven land values….From a financial point of view, I'd probably be better to go back where I came from in Northland now because [up there]…it's farmer versus farmer."
F30M23	"In our space [Canterbury] we seem to have more corporate farmers and big operations which, as a generalisation, do not seem to care for the land or the environment as well as family farmers."
F33A23	"I'm sick of seeing pivots and all the shelter gone, we are creating big factories...all you see are big green paddocks, pivots and cow udders...the whole feel is gone. My neighbours are all corporates, no family farms left…the corporates are just interested in making money. The community goes and the landscape changes."
F40A23	"I don't think corporate dairying has done any favours at all in Canterbury...and the rest of us are going to have to bear the brunt of it. It's just a game, just an investment …dairying in Canterbury has been a Ponzi Scheme."
F43A23	"Fluctuations in [income] in sheep and beef and arable are greater than dairy… which is why they haven't become a corporate model. A corporate model is pretty simplistic and can be rolled out in phases…arable and sheep and beef are not that simple."
F45M33	"There are corporate farmers…and some of them are very good at giving you the blah about how good they are technically and environmentally…We have a chap…ask any of his neighbours [they] will tell you that environmentally he is a crook… and he is part of Synlait's Lead with Pride [programme]."
F47L43	"From here on [up the road] there is another family farm and the rest are corporate farms and they have farm managers who are all about the same stage in their career and they stay for about five years each and they all have to make their mark…and they do that by increasing development… at the price of tussocks and matagouri…."
F49A23	"Traditional farming is dying, traditional farming families are on the outer and we are on the way out, very quickly. The dairy industry is an example, all corporate…and that whole tradition of carrying on the family farm is disappearing…it is a money-making operation…you don't know your neighbours anymore."

The descriptions in Figure 10b illustrate that the participants perceive corporate farming as a form of farming which is motivated to maximise the return on investment through either farm income or capital gain. It is not based on an attachment to place or a commitment to environmental stewardship or community. For many of the Canterbury-born participants, dairy farming in Canterbury is synonymous with corporate farming, even though there are dairy farmers in Canterbury (and within this research group)

who are intergenerational family farmers. In the feedback sessions, participants made a distinction between dairy farmers generally and Canterbury-born intergenerational family farmers who have converted to dairy farming. F11 who are Canterbury-born arable farmers and converted to dairy describe North Island-born dairy farmers as, “not like us; they are a breed apart.” Similarly, at a meeting of the Cheviot Branch of Federated Farmers (19th November 2019) a local farmer told me the Canterbury-born dairy farmers, “…are not really dairy farmers, they are just like sheep farmers”. The participants’ views about dairy farming as an activity are analysed in Chapter Five.

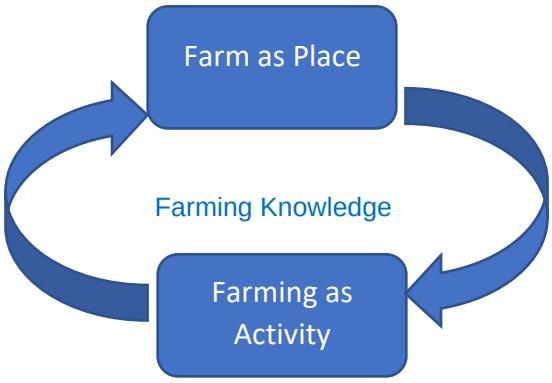
Participants F16, F22, F30, F34, F38, F39, F47, F52 and F53 refer to another model of farming in Canterbury, ‘farm development.’ The ‘farm developer’ is a business person or entity who buys a farm with the aim of ‘improving’ it through substantial investment in fertiliser and pasture, infrastructure and buildings. Farm developers are described by the participants as motivated by a desire to ‘create’ a farm rather than farm place, and their farming activity is usually supported by off-farm income. F39 describes that form of farming as,“…intimidating because they have so much capital.” Farm developers are usually business owners or overseas investors who spend a lot of money on ‘development,’ often on the advice of farm consultants, and sell again in a short time (anecdotally within five years) without recovering the full costs of their ‘development.’ F34 said, “..they come into this valley and they all limp out in about five years’ time…if they just farmed conservatively they’d work it out but they don’t, they roar in….” Similarly, F52 said, “People come up here and they are going to show everybody how to farm and they spend a lot of money and five years later they are gone.” F38, F47 and F53 theorised that ‘farm developers’ invest heavily in pasture development and buildings because those things are quick to create and highly visible compared with improving production on farm through animal breeding or building soil fertility, which take years.

In summary, the participants describe three farming systems in Canterbury: family farmers who ‘farm place’; farm developers who ‘make farms’; and corporate farmers who ‘make money’. It is beyond the scope of this research to explore the accuracy of the participants’ perceptions about farm developers and corporate farmers. However what is significant to this research is the shared perceptions of different models of farming within Canterbury with different farming motivations and practices. It raises a question about how multiple ways of knowing and doing farming fit with an environmental planning process underpinned by an understanding of farming as a generic activity.

The second cornerstone of the narratives is the understanding participants have of the relationship between the family farm, farming as an activity and the acquisition and development of farming knowledge. That relationship is depicted in Figure 11 (p.70). Intergenerational family farming is the farming of place. Participants know and express their relationship to place through farming place, and the activity of farming is learned through farming place. As will be discussed in Chapter Six, participants have sources of farming information which are external to the family farm, such as other farmers and agri-science. However, whether that information becomes farming knowledge is determined by its successful application to farming place. The three concepts of farming as place, activity and knowledge are inextricably linked. They have been artificially separated in this thesis between Chapters Four, Five and Six to analyse and articulate a complex narrative in a manageable way. Therefore while this chapter

focuses on the relationship between participants and the family farm, it should be read in conjunction with Chapters Five and Six.

Figure 11: Relationship between Farm, Farming and Farm Knowledge



The third cornerstone is the farming lens through which the participants tell their farming life-story. Non-indigenous intergenerational family farmers are not an amorphous group and farming is not a singular activity. As outlined in Chapter Three, participants are involved in different forms of farming, including dairy, arable and drystock (sheep, beef, deer) farming on varying topography, with and without irrigation. The participants describe arable, dairy and drystock farming as different activities which require different knowledge and skillsets: dairy farming is not sheep farming with cows, though some skills are interchangeable. Terms denote particular forms of farming: agriculture is a specific form of farming pertaining to the land cultivation to grow crops, while pastoralism is the grazing of livestock. Participants' ways of knowing, doing and describing farming are shaped by their farming backgrounds and experiences. These different ways of farming are analysed and discussed in Chapters Four to Six.

4.2 Farmer-Farm Relationship as Place-Attachment

The participants can be divided into two categories: those who are farming the place on which they were born and raised, a place that has been farmed by up to six generations of their family; and those who come from an intergenerational farming family but have moved from the original family farm. Among the 'movers' there are two sub-categories: those who have been forced by economic or familial circumstances to sell the original family farm; and those have moved to Canterbury because they perceive there to be better opportunities for farming than at 'home', for example, they may be younger siblings and unable to buy into the family farm. This latter category includes seven participants who have moved to Canterbury from the North Island to undertake dairy farming within the last 20 years. Those participants are referred to as the North Island-born dairy participants. Of course no two narratives are precisely the same, but within this research, differences in farmer-farm relationships appear to correlate with two variables: longevity in place; and type of farming, in particular differences between the narratives of dairy participants, and arable and drystock participants.

The participants understand the family farm as place. Their narratives are narratives about people-in-place: how they have come to be in place; how they understand place; and how they farm place to remain in place. Menzies (1970, p.110) describes his narrative as, "..a tale of people and property… the seclusion and isolation of the property have had a tremendous influence on the people living here." The narratives begin in one of two ways: those which make an immediate connection between people and place; and those which connect production and place. The narratives of Canterbury-born participants all start by linking people and place through either describing the geography of the farm followed by their historic familial association with place or vice versa, eg:"Foxdown was settled by my great grandfather Charles Fox and it was purchased by his father…he took up this block of land in 1877…" (F28L23); or "276ha of intensive arable on the south side of the Rakaia River with deep Templeton soils…The farm was purchased in 1924 by Richard's great grandfather …" (F39A23). The historic link to place is important and participants who have had more than 100 years on the family farm (F02, F03, F09, F11, F17, F18, F22, F28 and F33, F42, F43, F49, F50) or farming in Canterbury (F15, F16, F29, F30, F31, F34, F38 and F39, F51, F52, F53) mention that early in their narratives. In their study of farmers in the MacKenzie Basin, Morris et al (1997, p.59) described a key aspect of farmer identity as, "a very strong identification with the land and its continuity within a family." In contrast, most of the North Island-born dairy participants start by describing the 'effective area' of the farm, being the area which is in grass for milking cows, and the number of cows they milk: they start by linking production and place: for example, "148ha of farm supported by 100ha run-off…141ha effective, milking 502 cows, producing 260 000kg of milk solids…" (F24D23/1). However F32 and F36, both North Island-dairy farmers, start their narratives by talking about the family farm on which they were raised. To that end, there may not be anything significant in how the narratives start. What is significant is that all the narratives are about farming place, not a generic activity called farming.

The two themes of the family farm as 'people in place' or 'production in place' prevail throughout the narratives. Morris et al (1995), Jay (2005), and Stock and Peoples (2012) all suggest that dairy farmers are more production focused than sheep and beef farmers. In this research, the arable and drystock participants focus on the farm as land and nature: to borrow F07's phrase, they are narratives about 'longevity with the dirt'. The North Island-born dairy participants focus on the farm as a platform and resources for milk production and appreciate nature for its amenity value. If I can coin a parallel description to F07's, these narratives are 'longevity with the (milking) shed.' The narratives of the Canterbury-born dairy participants seem to be a blend of these two themes. Their narratives are more 'with the dirt' than those of the North Island-born participants but more 'with the shed' than the narratives of other farmers. Jay (2006) suggests that for some farmers the farm is a place of business and for others a place of dwelling. However, in this research, no narrative describes the family farm as a 'business'. Some participants spoke of 'the business of farming' and F20 mused that family farmers may be fiscally 'better off' if they did regard the family farm 'as a business'. However, all participants identifed the family farm as home, and their primary goal is to remain in place and pass the farm on to the next generation. These attachment-relationships to place and the motivators to remain in place are explored below.

The quotes in Figure 12 illustrate that the family farm is 'home.' This understanding of the family farm as home is shared by all participants irrespective of whether the family is still farming the original family farm

or has moved. Within the family farm there is little, if any, separation of farm from home or from family, and that porous relationship is expressed physically and psychologically.

Figure 12: Family Farm as Home

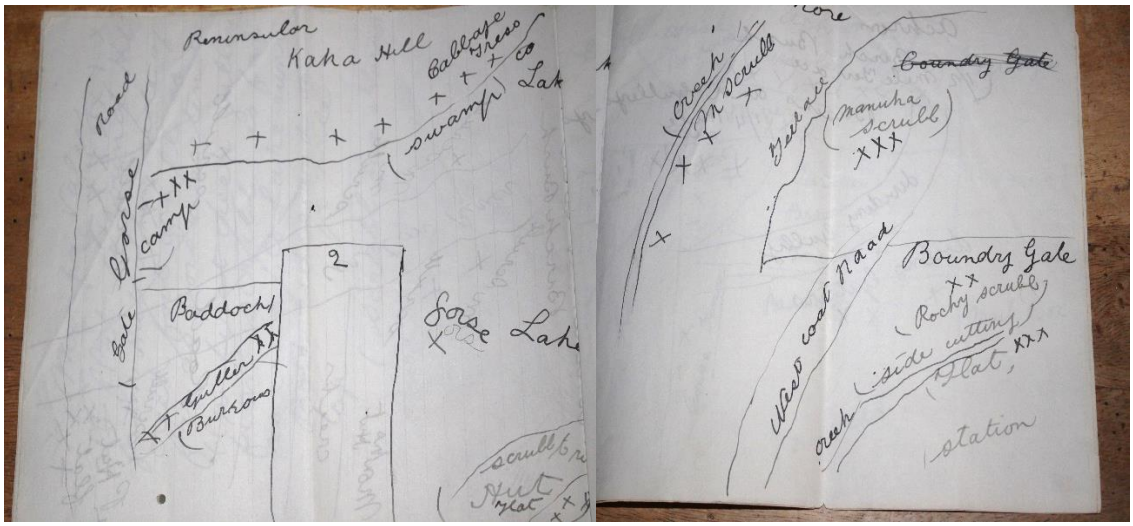
F08L43/1	"It's your home, it's your life!"
F13M13	"I've been home for coming up 12 years."
F20D12	"It isn't just a farm business or a farm house, it is everything."
F31D23	"Twenty-one years ago I came home, didn't I?"
F48A22	"So we came home farming Gina and I in 1990…. I had always wanted to be a sheep and beef farmer with a bit of hill country…but you get to a point of attachment where it is home and you no longer want to move."
F46D23/1	"The farm we had in Morrinsville was in the family for about 67 years. It was bought by my grandfather… I was just in love with it. Then…I decided to…come down south… I could have bought a larger property…more suited to development…[but] some places just feel like home."
F47L43	"You get some emotional sentiment about it [family farm]..I've never shifted I suppose. Every time I travel I am always happy to come home no matter what the weather!"
Forrester	"Jim bought me home to Black Hills, a bit of country that I would soon get to know like the back of my hand" (2015, p.70).
Stapleton-Smith	"Often forces far beyond anyone's power to predict or control cause humans to leave the land they call home. If only humans could be like that of birds, who like a place, find it suits them and stay for generation after generation" (1990, p.205).

The kitchen table is the hub of family life and of the farm. F9 observed that farming is done around the kitchen table; the bank manager, grain merchant, agronomist, even the occasional researcher, are hosted around the kitchen table. For those who are on the original family farm, 'home' is understood in an extended sense being not only where one resides, but where one belongs. That sense of belonging applies to both those farming place and to extended family who have ties to place. McRae (1968, p.79) wrote about her grandfather-in-law W.R. McRae contemplating the sale of Glens of Tekoa in 1908, and his sister writing, "I am sure I do not care if I never saw another sixpence from Tekoa, but I would like as long as I live to feel that Tekoa is my home." Dominy (2001) observed a strong attachment to natal land among the sisters and daughters of the farming families in her research. A similar attachment to the family farm as home is expressed in the narratives of participants who have moved from the original family farm. McLauchlan (1981) suggests it takes three generations in place to form an attachment to land, but F20 estimated it took his family, "10 years to put roots down" when they moved from Auckland, while F46 bought his farm in Canterbury because, "it felt like home." The narratives indicate that all the participants, share a conceptual understanding of the family farm as 'home' irrespective of their farming background or their longevity in place.

The second attachment-relationship described in many of the narratives is an attachment to the family farm as identity and the strength of this attachment correlates with longevity in place. The participants who are farming the place on which they were raised describe an attachment to the family farm as identity. Those participants say they are 'of' place when introducing themselves; "It's Richard Stewart of Rosebank here" (F39). Bardsley (2009) notes the tendency of farmers to name family after place, while Newton (1973) observes that where a farm has been owned only by one family, it often becomes known within farming circles by the family name, for example 'Gerard Country'. Among the narratives analysed for this

thesis, family names and farm names intertwine. For example, children in each generation of the Murchison family have the middle name ‘Coleridge’ while the Fox Family farm Foxdown on the Foxdown Rd. Those participants who have moved from the original family farm describe the place they farm now as home, but their identity is associated with the place where they were raised. F32, son of a fifth generation Waikato dairy farmer said, “mostly opportunity brought me down here and will keep me down here but I am still a Chief’s supporter…” [rugby franchise based in Waikato]. As noted in Chapter Two, Hatch (1992, p.6) argued that the farming communities he researched in South Canterbury were bounded in their identity, farming systems and sense of community, in ways that reflect the topographic characteristics of the district, while Dominy (2001, p.125) suggests individual, family and farm identity, “…are inextricably linked to each other and permanently fixed in space.” The attachment relationships expressed in my research are slightly more complex, which may reflect the larger, more diverse participant group. In the narratives I analysed, the family farm is understood conceptually as ‘home,’ but place as ‘identity’ is created through longevity in place. For those participants who have moved ‘identity’ is associated with the family farm on which they were raised.

Figure 13: Copy of Hand-drawn Farm Map 1878 (courtesy of F02)



A practice which reinforces the notion of the family farm as identity is the creation of farm geographies, through naming places on farm and creating farm maps, which are an essential farming tool. Nearly every participant in this research told their story with a farm map spread on the kitchen table, and most written narratives include a farm map. Figure 13 shows part of an original farm map of the Acheron Bank hand-drawn by F02’s great grandfather in 1878. Named on the map is Kaka Hill (pronounced kaw-kaw) which may be a bastardisation of the Māori word for ridge top - te kaka. The practice of naming melds people with place and creates an historic geography that reinforces familial links with place. Knowing the stories behind the names creates distinctions between those who are and are not ‘of place’. Clucas (2012) wrote of being sent to the ‘Chou Paddock’ on his first days as a shepherd at Lake Coleridge Station and being unable to find a paddock growing choumoellier. The ‘Chou Paddock’ was so-named because it had once grown a great crop of choumoellier, something only those with historical links to place would know. Dominy (2001, p.137) observes among her participants, “a total environment that is named with reference

to both physical features and human associations such as personal names and historical events as well as idioms of orientation" which, she argues,

> "…creates a reading of the grammar of the landscape and reserves an often unstated and uniquely local history and sense of continuity with the past as names are passed down from generation to generation."

Beattie (1945) records Ngāi Tahu whānui named places after physical features or events in the landscape which he argued helped retain social memory of ancestral association with place. These naming practices contrast with those of the colonial administrators of early Canterbury, who named places in Canterbury after prominent British families who were not physically connected to place (Deans, 1964; Britten, 2000).

Figure 14: Descriptions of the Family Farm and Nature

Narrative	Description or Quote
F07L42	"We have quite a lot of bush and scrubland on the place and areas of tussock because Dad considered tussock and matagouri provide shelter for lambs."
F11M43	"A lot of farmers don't get how important those wetlands are – a huge sponge which controls the run-off from the hills, slows down the floods by having that sponge… swamps are more important… they've got a job in the environment to do."
F15M23	"We have quite cool bird life here, a lot of quail, pukeko and stuff so every now and then we have a bender on stoats, possums and ferrets."
F16L33	"I was brought up with a huge awareness of the environment and natural life in that…my father was a fisherman, a naturalist and a bird watcher… those things I just took for granted."
F19D33	"You see a kingfisher sitting on a power line and it just makes your day...that's farming, that's nature."
F23L33/1	"I love the four seasons…I come from central Hawkes Bay and we were up in the mountains…"
F28L33	"When you look up to Mt Alex…there's coprosma and…kowhai, cabbage trees…"
F30L23	"The coast is spectacular. There is a spot over there we have always camped and it's amazing."
F33A23	"It would be nice to have a bit of bush; you can't beat a bit of bush but I think it would be unwise to buy a farm near any river the way the rules and regulations are going…."
F36D23/1	"The river's…got an aesthetic value…we stand out there and it's a beautiful place to live…."
F38H33	"As a family we are always drawn to the bush."
F47L43	"Wind back the clock 50 years and this place was basically all tussock….what happened to us is the Land Development Loan era…But we did keep ribbons of swamps and tussock blocks…I remember having this discussion: if we rip into this, what are we going to have left to show our children? "
F48A22	"We are a bit lucky…the Cust River is just over there, over a wee rise and it's a different world …it's just got a lot of character…."
F52H33	"When we looked up at Terako, looked up at what we covenanted we had to make the head rule the heart as to whether we bought it or not, because we both wanted it."
F53L23	"We are all hill country so it's farming with nature…it's just the allure of it, the fitness [required of shepherds], the hills, the horses and dogs…and once you are in there, the beauty of it."
Anderson	"It's [Wilberforce River] voice is in my ears day and night. I fall asleep to it, dream with it and waken to it" (1968, p.131).
Harper	"…always before them [farmers on the Rangitata Plains] the mystery and story of the mountains and the hills to uplift their spirits" (1972, p.53).
McLeod	"The beech forest had always fascinated me" (1974, p.19). "…the first sight of Grasmere country as you drive along the West Coast Rd is one of the most beautiful I know" (Ibid, p.28).
Menzies	"To quote Grandad…'is it not a sad thing that only the first settlers will see New Zealand as the glorious country it once was…rich in herbs, grasses and beautiful shrubs …'" (1970, p.45). "How glad I am that I had that time of wild life just as it comes from God's hands…"(Ibid, pp70-71).
Porter	"I could understand the mountaineer's urge to climb but like them I'd be stumped to put into words exactly what it was that made the hills such an attraction" (1970, p.34).
Stapleton-Smith	"On the way back home we are visited by a dolphin…this sight always seems to add a blessing to our day – a gesture of friendship from a creature of the sea" (1990, p.13).

The third place relationship described in the narratives is one of the family farm as being in nature. McRae's (1968) quote of 'a love of the land' opens this chapter and Dominy (2001, p.159) records one of her participants saying, "you have to include us as part of nature." All participants express affinity with the landscapes of place, and enjoyment of working or being in nature and examples of this expression are shown in Figure 14 (p.75). Two relationships with nature are described in the narratives: those who understand the family farm as nature; and those who regard the family farm and nature as separate entities, one of which has production value and the other amenity or ecosystem value. This distinction is consistent with the description I gave earlier of the narratives of arable and drystock farmers being 'with the dirt' and those of the dairy participants being 'with the (milking) shed.' Knowing nature as separate from production land on the family farm but valued for intrinsic and amenity reasons aligns with Howitt (2001) and Berkes (2018) Western conservation strategy described in Chapter Two. This notion of different ways of knowing the role of nature in farming is explored further in Chapter Five.

Farming narratives are narratives about place, and place sits in nature. Many participants have paintings and photographs in their homesteads or in their written narratives which depict the farm buildings situated within and dwarfed by nature in the form of dramatic landscapes of expansive plains or soaring mountains. Turner (1983, pp35-36) describes the high country as being depicted in representational paintings, "…of lonely, remote and wild places," but the narratives of other farmers suggest this love of nature and farming in nature is not limited to high country farming families. Pawson (2018, p.183) notes the use of natural landscapes lightly farmed (by European standards) in the marketing of products by Banks Peninsula Farms and describes it as, "...portraying farming in and with nature." Within my research, participants depict farming as being in nature: arable farmers typically have historic scenes showing plough teams 'with the dirt' while hill country farmers have pictures of shepherds and pack horses making the lonely trek out to muster, or shepherds, dogs and sheep in dramatic country mustering off. Examples of these typical farming scenes are shown in Figures 15a to 15h. There are few 'typical' dairy farming scenes of this nature which may reflect the history of Canterbury as predominantly arable and pastoral farming, or it may reflect the distinction I argued above, between arable and pastoral farming as being 'with the dirt' and dairy being 'with the shed.'

Figure 15a Manuka Point Homestead (Morris, undated, p.33)

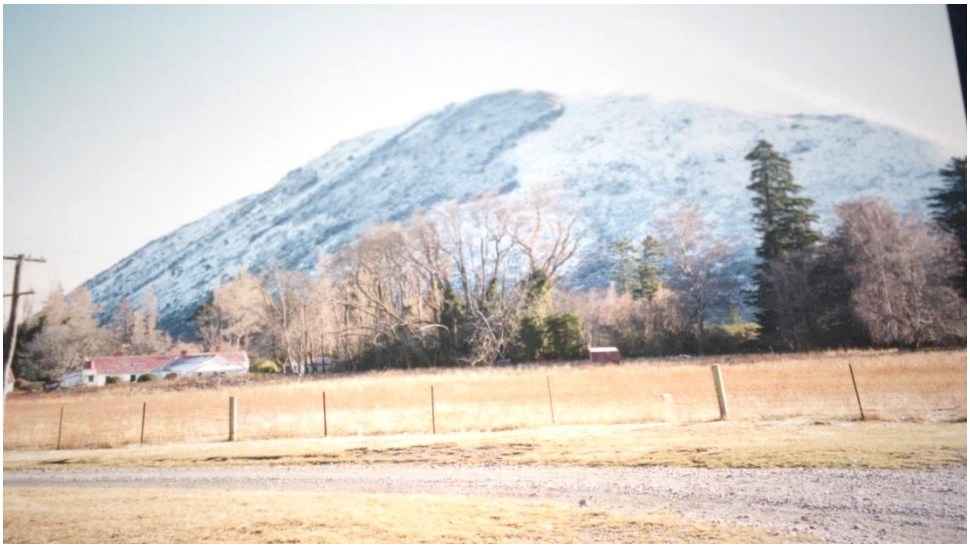


Figure 15b: Lake Coleridge Homestead (courtesy F02)

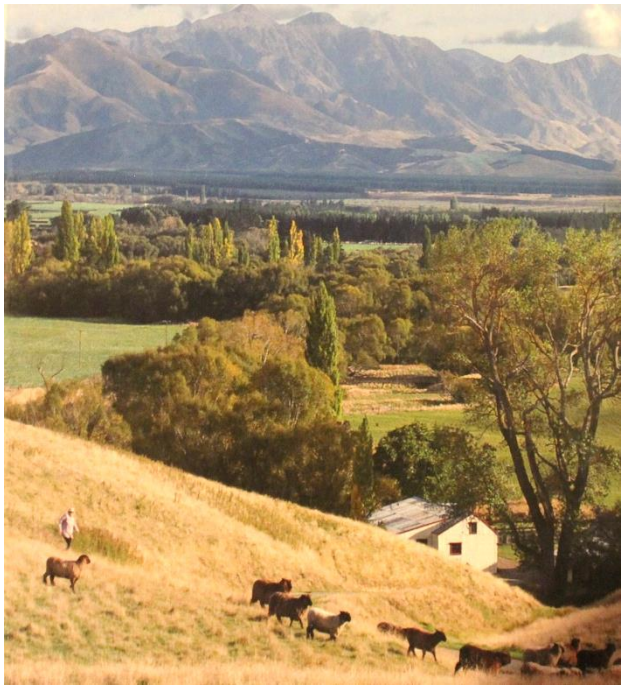


Figure 15c: Black Hills (Forrester, 2016)

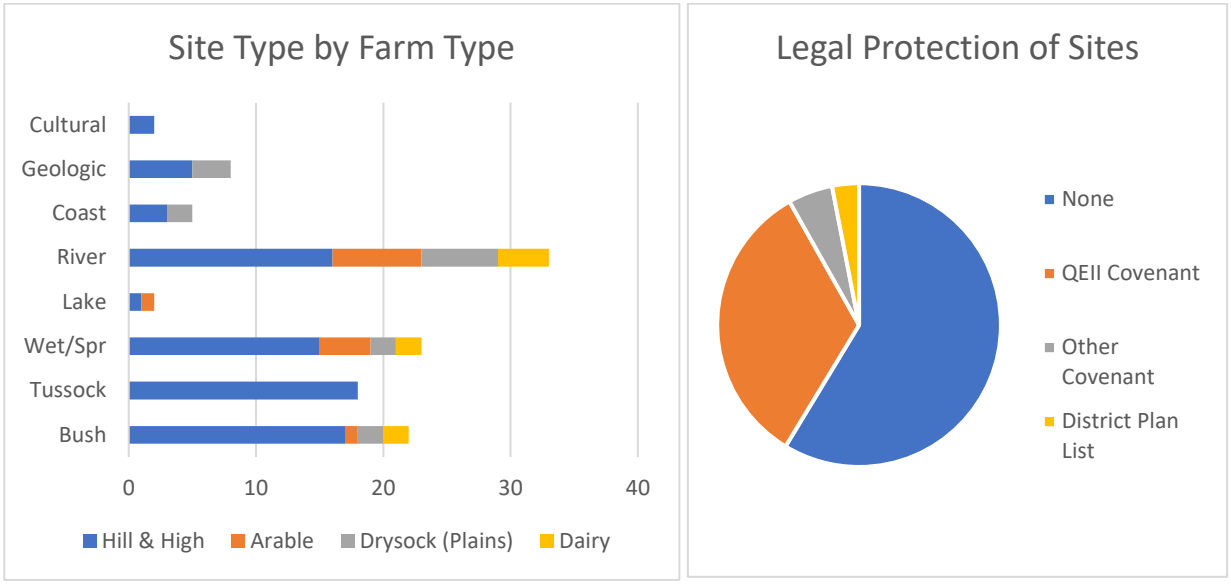
Figure 15d: Bayfields (Lake Coleridge Tourism Group, 2005)

Figure 15e: Plough Team 1924 (Andrews, undated, p.42)

Figure 15f: Packie and Team heading out (Clucas, 2012)

Figure 15g & 15h: Crossing the Ryton River (Lake Coleridge Station) and mustering Glentanner Station (courtesy, F02)

Figure 16: Sites with Conservation Values



Many participants described sites and areas on the family farm that have particular ecological, amenity, geological or cultural values. Figure 16 graphically depicts conservation sites on the participants' farms, classified by the type of site and the type of farm. Many hill and high country participants have multiple conservation sites on their farms, but some more intensively developed arable and dairy farms have conservation sites too. The graph shows the number of participants who have conservation sites on their farm, not the number of sites. I have not included information from the written narratives in Figure 16 because, depending on when the narratives were written, those sites may no longer exist. Figure 17 (below) includes examples of how participants describe their affinity with those sites and their understanding of their role in protecting them as part of place; even when the families were offered fiscal subsides under the Land Development Loan schemes to clear them in the 1970s. The quotes from Roberts (1946) and Menzies (1970) suggest those values are not exclusive to the current generation of farmers nor are they examples of participants telling the researcher what they think may be advantageous.

Some of these sites are internationally significant and farming families have enjoyed long-standing relationships with specific researchers or research institutions over time. Consequently, the participants hold comprehensive knowledge about the sites. On the face of it, the participants' place-attachment relationships and interest in and ethics towards nature appear to be an ideal platform to secure the protection of sites with significant ecological, geological or landscape value. Yet, Figure 16 shows that over half of the sites referred to in the narratives do not have formal legal protection either by covenant or listing in the relevant district plan. Rather, the participants manage what I have dubbed an 'underground conservation network.' For sites that do have formal protection, the mechanism of choice among participants is a QEII Trust Covenant or similar. This issue is explored in the case study in Chapter Seven.

Figure 17: Views on Protecting Conservation Sites on Farm

Narrative	Description or Quote
F06L43	"In an ideal world it should all be protected; all the wetlands…There are 3 sites on here…they're all springs with a bit of Carex. Because we farmed relatively conservatively over the years, they are still there. They are not fenced off but you don't rip them up."
F10M43	"If I had them [conservation sites] I would want to protect them. I'd have to make a decision on each thing."
F16L42	"In the late 1970s we thought it would be a good idea to preserve the big swamp at the bottom …our very first covenant. It was pretty unique and needed protecting…. We've got 5 wetlands…We think the QEII model is an excellent model, it's a very co-operative one."
F16L42	"In the late 70s we thought it would be a good idea to preserve the big swamp at the bottom and you got in touch with what was the very new QEII Trust…and that was…our very first covenant. It was pretty unique and needed protecting… "Tarn Paddock… had a ditch…right through it …so the half nearest the road we cultivated…I thought it was a pity because the amount of land we got from it was a waste of time…:"
F26M42	"The [kowhai] …have all fallen over now but Trevor used to plough around them. We have fenced off four blocks of bush here now and planted over 6000 native trees…I was looking at a [old] photo one day …it made me realise how much [bush] we were losing."
F27L43	"We have wetlands, some with hydrological values and some with ecological value…We've got little land-locked inanga and stuff."
F28L23	"Broadleaf Gully is 4ha which I got a biodiversity grant for fencing, and I spent about $1-1500 planting natives. There are 200 year old broadleaf's in there…I had an ecologist report on what would have been here pre the 1400AD fire that swept through North Canterbury...."
F30M23	"Down at the beach there is an area that has karaka trees, the most southern ones there are, I think. So we'll put a fence around those [though] some of them are falling over with age."
F38H33	"When we did the first covenant…I remember thinking am I going to regret this? It is the earliest paddock, the safest, is sheltered, it could be the most productive block…The family are very proud of the covenants…they want one each!"
F45M33	"Leanna…she was doing her PhD at UC and she is an expert on Canterbury mudfish and she reckoned we had the best population of Canterbury mudfish…and we had the world's rarest aquatic fish species [in our creek] and if you have something, a taonga like that, you have to look after it."
F47L43	"We've got quite a few [lizard colonies], there is one I'm very proud of just at the gate…There are lots of lizards, rock quails, precious birds…so official conservation areas no but we do have several spots…we are protecting them anyway."
Menzies	"Our conscience had smitten us to the extent that we began protecting and preserving a small area in the Tank Paddock and at a late date (1964)…it is only a pale shadow of the glorious covering with which nature clothed these hills and valleys before the advent of Europeans" (1970, p.74).
Roberts	"To burn tussock lands as frequently as is the custom would make it impossible for my kowhai to survive…I find myself balancing between fire for grass production and the preservation of my kowhai and the natural drift back to immersion in scrub" (1946, p.14).

The notion of the family farm as being in nature and participants valuing nature seems, at face value, inconsistent with their opposition to rules to protect SNAs and ONLs in district plans identified in Chapter One. Also, it seems at odds with the historic pattern of clearing indigenous vegetation and draining wetlands that has characterised farming in Canterbury since colonisation. However, these paradoxes are symbolic of the very issues discussed in Chapter One and are at the heart of this research topic. The issues reflect tension between a Western planning paradigm that seeks to 'protect' sites by removing them from any use (Howitt, 2001; Berkes, 2018) and the participants' understanding that the sites remain on farm because of the way they have been managed as part of farming place. In writing on indigenous TEK, Berkes (2012, 2017) argues that the notion that people cannot both modify and value nature is a contemporary Western paradigm which frustrates indigenous ways of knowing. He writes of a "romanticised view" among some Western scholars that,

> "…'primitive people' live, or at least once lived, in some undefined condition of harmony with nature engaged in environmentally benign ways of exploiting resources which either could or would not have allowed people to alter what nature provides" (Berkes, 2017, p.91).

Assuming farmers cannot value nature today because of land clearance in the past reflects an ontological understanding of knowledge and behaviour as conceptual and fixed over time and space. However Bromley (2004, p.112) argues that, "At different times and in different places nature has been evaluated and responded to in varying ways." Similarly, Pawson (2001) writing about bush clearance on Banks Peninsula in the nineteenth century noted that such actions were regarded by most in society at the time as 'progress'. F30, F38, F47, F50 and F53 made similar points about how their families' understandings of the value of indigenous vegetation and wetlands on place have changed over time. On the other hand, F06, F07 and F16 said that their families have always valued nature and retained indigenous vegetation and wetlands on farm despite fiscal subsidies from successive governments to develop that land. By necessity, all farming systems modify landscapes and ecosystems, sometimes with significant effects (Butler, 2006; Berkes, 2012, 2018; Whyte, 2013). Johannes (1994 in Berkes 2018, p.101) suggests,

'"A group of people is said to possess a traditional conservation ethic if they have an awareness that they can deplete or otherwise damage their natural resources, coupled with a commitment to reduce or eliminate the problem."

McLauchlan (1981, p.24) claims that sheep farmers and dairy farmers have different attachments to land; that sheep farmers are 'farming families' but,

> "…a dairy farmer has the same attitude towards his property as an urban homeowner. He may be attracted by another property down the road or in a better part of the district."

However, in this research, all participants shared a goal to remain in place and to hand the farm on to the next generation. There was no obvious distinction between the dairy and non-dairy participants in this regard, which may reflect that all the participants in this report are *intergenerational* family farmers. In their study of farmers in the MacKenzie Basin, Morris et al (1997, p.59) observed that a measure of farming success was the length of time a family had remained in place. Unsurprisingly, those participants who are on the original family farm expressed most adamantly their intention to remain in place. F28 said, "selling the farm would be the worst day of my life;" F11 said, "no one wants to be the generation who has to sell"; and F51 said, "I don't want to control it beyond the grave, but it won't be sold while I am here." Participants who have moved from the original family farm, whether by an enforced sale or voluntarily, all expressed a sense of attachment-loss.

For those participants who have been forced to move, there is sadness, for some a sense of failure, and a determination to recreate that intergenerational attachment to place on the new family farm. Inch (2008, p.40) described the process of having to sell the family farm and it being bought for a dairy conversion in 2007:

> "The despair and heartache for John, Doris and family is obvious, seeing their hard work undone in a matter of weeks…[as shelter, fences etc were ripped out] we do, however, still have the memories of the moments spent living, working and breathing this land. "

F51's family was forced to sell their station after the agricultural reforms of the 1980s referred to in Chapter One. F51's wife said, "I know how hard it was for the family to move, it broke a lot of their hearts completely" and she believes after they bought their new farm, her husband was determined never to move again. Dominy (2001, p.114) observed a similar desire to maintain intergenerational place attachment among her research participants noting, "Farming continuity from generation to generation is valued even if it means beginning again." The North Island-born dairy participants, who may fit McLauchlan's (1981) claim of being more willing to sell family farms, also spoke about their original family farms with a sense of nostalgia. F05 spoke of his pain at selling the family farm in Taranaki but at that time none of his children wanted to go farming. However he and other participants who have moved voluntarily did not express the same sentiment that the [new] family farm is never for sale. The significance of this observation is to reinforce that farmer-farm relationships and motivators to farm vary, not only between farming cohorts, but among a cohort of non-indigenous intergenerational family farmers.

Because the primary goal for all participants is to remain in place, their farming life-stories are anchored around events which they perceive have threatened the ability of the family to remain in place. This can include the impact of economic downturns such as the Great Depression and the agricultural reforms of the 1980s, severe adverse events such as droughts, floods or snow, and pest incursions such as rabbits and Nasella tussock. Also, the narratives describe strong cultural mores around the 'right' of intergenerational family farmers to do whatever is necessary to retain the family farm. Figure 10a includes quotes from F12 and F20 about 'fighting' for the family farm, and various narratives tell of family farmers undertaking unorthodox and sometime unlawful activities to 'hang on' to place. The most discussed example is the farmers who were involved in the illegal importation and spread of Rabbit Haemorrhagic Disease Virus into New Zealand from Australia in 1997 as a biological control after the New Zealand government refused to import it. Miller (2011, p.181) labels farmers as 'environmental risk-takers' and undoubtedly activities of this nature fuel that perception. However, many of the hill and high country participants in this research described those farmers as 'heroes' and the strongest condemnation was, "they probably should not have done it, but they were desperate, they were going to lose their farms" (F02, F03, and F50). This goal to remain in place seems to be a much stronger driver for how participants farm than maximising profits or complying with environmental regulations, as will be discussed in Chapters Five and Seven.

As well as remaining in place, all participants aim to have the family farm ready to pass on to the next generation, in as good or better condition than they received it. There is a shared understanding that 'better condition' means no deterioration and ideally an improvement in soil fertility, pasture health, infrastructure and pest management. Improving farm income or ensuring the farm remains economically viable is the responsibility of the next generation, with the assumption that if the farm is passed on in 'good condition' the next generation has the building blocks to achieve that. F10 observed that, "The older you get the more important it becomes to keep it [the family farm] for the next generation as it was kept for you". Older participants describe being expected by their parents to take over the family farm, but all

participants said they believe that taking over the family farm must be a child(ren)'s choice. However, the narratives of younger participants suggest there is still covert pressure on the next generation to continue the family farm. F31 and F41 were both told by their mothers to come home if they did not want the family farm sold. F31 said,

> "'If you don't come home I don't know what will happen, your father will probably die of the shock of having to sell', I think were her exact words, so I felt a wee bit of pressure, but also the emotional tie of the family farm."

To that end, farm succession is identifed by most participants as the issue likely to threaten the ability of the family to remain in place, and the desire to enact farm succession can result in significant life-decisions. For example F02 and F06 both had only two children to make farm succession easier, and F28 suggested the only reason the farm had remained in his family was because "there was only one son in each generation and in those days the girls got nothing." The wives in participant families F04, F06, F22 and F50 all received inequitable inheritances from their own parents in favour of brothers, to keep farms in the family. Dominy (200, p.111) recorded similar stories in her research, identifying what she labelled as 'the inheritance principle' - "You can never have one buy out two, it's impossible". Even when siblings do not buy each other out, succession eventually becomes an issue. F09 farms in partnership with two brothers and is unsure what happens when they retire and "…it's cousins not siblings farming together."

4.3 Describing the Family Farm as Place

Section 4.2 described how participants relate to the family farm and this section discusses how participants describe the family farm. Two themes are explored: how participants describe the family farm generally; and their specific descriptions of their local environment using the examples of soils and weather. How participants describe the family farm reveals aspects of their ontological understanding of the farmer-farm or human-environment relationship, as well as the nature and extent of their local environmental knowledge.

F30 suggests farmers see landscapes differently from other people: where other people see landscapes as 'natural' and unchanging, a farmer sees a landscape that has been modified by and for farming. Similarly, Dominy (2001, p.289) records that her participants did not see landscape in visual or panoramic terms but, "…in grounded interactive terms where cultural practices embody socially and geographically situated experience, knowledge and skill." Fernyhough (2007, p.203) tells of how she started to look at landscape differently once she purchased Castle Hill:

> "Previously I'd driven through what I saw as scenery; now I found myself thinking that the wind must blow from the south-west because of the position of the shelter belts or noting who had Herefords or Charolais or Angus [cattle]…."

Fernyhough was beginning to see landscape through a farming lens, in her case a sheep and beef farmer's lens. People-in-place know place differently from 'outsiders'. Howitt (2001, p.62) suggests that, "…while dominant members in a society may see places as 'wilderness' or 'frontiers' for indigenous

people they are their homelands" and Sandercock (2003) argues for the importance of understanding how local people view their environment in urban planning. To that end, every farmer's landscape lens is specific, but underlying that specificity are shared patterns of how participants describe the family farm.

The family farm is described in the narratives as an entity in its own right, independent of the farmer, with its own characteristics and history. The participants do not describe the family farm using possessive determiners; it is not 'my farm' or 'my property' but 'the farm' or 'this place.' This language seems to be used across all narratives irrespective of whether participants are on the original family farm or are the first generation on a new property, suggesting a shared conceptual understanding of the family farm as an independent entity from the farmer. Many participants describe themselves as custodians of place for their lifetime, but 'owning the farm,' in the sense of having freehold Title or a perpetual lease, is essential to ensure that custodianship is recognised legally and socially. This recognition of custodianship may explain why the QEII Trust covenant process and similar environmental management systems that recognise the custodianship of landholders are so popular with the participants. This notion is explored further in the case study on managing conservation sites in Chapter Seven.

Figure 18: Descriptions of the Family Farm, Characterised and Personified

F21L23	"It's a dry, awful farm at the moment...."
F42L23	"It's a tough farm…it's a love-hate relationship…."
F43A23	"It's an awkward paddock…"
Anderson	"[Mt Algidus]…is not a gentle beauty, but one of strength and character" (1968, p.157.)
Burton	"…the unchanging hills (can such a thing be) look down in wonder at the hurrying, scurrying mannikins on the plains below...." (1939, p.166).
Keer & Keer	"[Birdwood]…a rough old shingle, scree and tussocky nightmare, but I loved her" (2000, p.10).
McLeod	"The house offered a superior position from which to watch the never-ending pageant of the mountains" (1974, p.45).
Roberts	"My story would not carry any significance if it did not contain some direct reference to the esoteric side of life, for these very hills breathe of such an atmosphere" (1946, p.9).

Figure 18 provides examples of how family farms are characterised and personified in the narratives. Burton (2004, p.206) observed a similar phenomenon among family farmers in the United Kingdom, nothing that, "…some farmers anthropomorphise their land, comparing it to a member of the family." Similarly, nature is described in the narratives as an independent entity, which is characterised, personified and feminised. A prudent farmer farms 'with' rather than 'against' nature because as F19 quipped, "if you farm against nature, ***she*** will bite you in the bum" or as F53 suggested, "***she*** will belt you long before the bank manager does" (emphasis added). The story of farming 'with' nature is told in Chapter Five. Turner (1983, p.66) argues for evidence in the writings of high country farmers of, "…kinship with the land." Whether it is kinship or another descriptor, the narratives suggest the farmer-farm relationship is not based on utility underpinned by a subject-object dichotomy. Rather, I argue for evidence of a human-environment relationship that more closely resembles a subject-subject dichotomy – a partnership built on reciprocity.

The family farm is not compartmentalised into areas for dwelling, farm production, and environmental protection. Rather, the family farm is described as one integrated landscape comprised of two interdependent systems operating across a geographically defined space. For the purposes of this research I have named those two systems as natural capital and socio-economic capital. The term 'natural capital' emerged globally in the 1990s and the Natural Capital Forum defines it as, "the world's stock of natural resources which include geology, soil, air, water and all living things" (www.naturalcapitalforum.com). Natural capital is also a term that I have heard used among drystock and arable farmers in Canterbury. In this context, natural capital describes the natural resources on a farm that both enable the farming of place and determine the type of farming that may be suited to place considering soil types, topography and aspect, climate, access to water and vulnerability of place to adverse events and pest incursions. Chapter Five includes a discussion about the concept of farming by matching land use with natural capital. 'Socio-economic capital' is a term I have coined for this research to describe those aspects of the family farm that are determined by people rather than nature, for example: stock breeds or cultivars; workers and advisors; infrastructure; amenity values; and economic factors such as commodity prices and farm finance. Wild ecosystems are identifed by some participants in this research as part of natural capital and by some as amenity values and therefore part of socio-economic capital.

Every narrative describes the family farm as an integrated system comprising both natural capital and socio-economic capital, in place. However the extent to which the narratives focus on natural capital or socio-economic capital correlates with the type of farming the participants do. Drystock and arable participants focus on natural capital in their narratives. Arable farmers talk about soils, drystock farmers talk about 'country' - which is a collective term to describe soils and topography, and they both talk about climate, generally and extreme weather events, in particular. They identify wild ecosystems on farm as part of natural capital and describe them as having an integral role in farm production. For example: all arable and most drystock participants discuss the importance of soil biological activity; F39, F43, F48 and F49 discuss the importance of providing habitat areas on farm for beneficial insects and bees; and F02, F03, F11, F16, F38, F41, F47, F50, F51 and F53 discuss the role of wetlands on farm as a source of stockwater during drought and snow, and their value in slowing rainfall run-off and filtering sediment. All hill and high country participants value indigenous bush and tussock in providing shelter and shade for livestock and for creating microclimates that retain soil moisture and grass growth. F51 told of his son coming home after an agri-science field day all enthusiastic about replacing their tussocks with improved pasture but, "…common sense prevailed." These participants value wild ecosystems for their intrinsic biodiversity and amenity values, but they have a utilitarian role in farming place as well. This holistic understanding of the family farm as the interaction of production ecosystems and wild ecosystems differs from the approach of separating production land from protection land that underpins Western conservation strategies (Howitt, 2001; Berkes, 2017) and the environmental planning process.

The narratives of the dairy participants are more centred on the socio-economic capital of the family farm and how that enables them to produce milk. The narratives are centred on prices, production and people: the core role which milk prices play in determining the economic viability of the dairy farm; the need to attract and retain good staff; and the need for good infrastructure to support grass growth and milk production. Wild ecosystems are regarded as adding amenity value to the farm, and planting and fencing

riparian margins and wetlands is done to meet supply contract conditions or regulatory requirements. However wild ecosystems are separated from 'production land,' they are not an integral part of the farm production system. The narratives of the Canterbury-born dairy participants are a blend of the two approaches discussed above. They are more focused on natural capital than those of the North Island-born dairy participants but place greater emphasis on socio-economic capital than the narratives of the non-dairy participants. All the Canterbury-born dairy participants have a background in arable or drystock farming, and this background influences the farming lens through which they understand and describe the family farm. The influence of arable farming on the participants' farming knowledge is discussed in Chapter Six.

Jay (2006) argues that dairy farmers are more focused on economic production and sheep and beef farmers on lifestyle choices. Another explanation is that the participants describe the family farm through their farming lens, and their farming lens is focused on those aspects of the family farm that they consider have the most influence on their ability to remain in place. For arable and drystock farmers, it is the combination of soil or country and weather that has the greatest influence on their farming production and income, and therefore the ability to remain in place. For dairy participants, milk production, milk prices and people (staff) are the main determinants of their ability to remain in place. The notion of understanding the family farm through a farming lens reinforces the relationship between knowledge of the family farm and farming, depicted in Figure 11 (p.70). Also, it shapes the nature and extent of the participants' local environmental knowledge which is discussed below. The different role of wild ecosystems on place is significant in understanding conflict between some non-indigenous intergenerational family farmers and the environmental planning processes, which is discussed in a case study in Chapter Seven. It explains why the approach to managing conservation sites in environmental planning processes engenders more conflict from hill and high country farmers than dairy farmers.

Local Knowledge of Soils and Weather

The detail with which participants describe the family farm indicates the nature and extent of their place-specific environmental knowledge. One of signposts for different ways of knowing depicted in Figure 4 (p.30) pertains to understandings of knowledge and how it is obtained. In particular the difference between conceptual, theoretical knowledge generated in formal academic and research settings and experiential, contextual knowledge acquired from being and farming in place, and passed down orally and practically through generations. The narratives include comprehensive and complex environmental knowledge of place, particularly among the Canterbury-born participants. Unsurprisingly, local environmental knowledge increases with longevity in place.

Participants' knowledge comes from their own observations and experiences farming place, information they have acquired from previous generations orally or through reading old farm diaries and records, and from studies undertaken by scientists in their area. How participants source farming knowledge is discussed further in Chapter Six. In this section I analyse the information in the narratives about soils and weather. I have chosen these two topics for three reasons. Firstly, soils and weather are key components of natural capital systems on place. Secondly, Holland (2013) suggests that the first indication of

developing local knowledge among settler farmers in Southland, New Zealand, was the increasingly detailed descriptions about weather patterns that emerged in farm diaries from the 1860s to 1880s. Finally, in Chapter One I described a scenario whereby a policy advisor working with farmers advised a Hearing Commissioner that in her experience most farmers do not know their soil types. I am keen to assess whether that situation applies to my participants.

Figure 19: Descriptions of Soil

Narrative	Description or Quote
F30L23	"I think the Overseer budget listed about 80 different types [laughter]. We've got some downy country …about 100ha…all silica sand and coming out of it is a wee limestone ridge, so essentially coarse, free draining, low carbon, very sandy, prone to under runners. The rest of the farm…is that real deep clay or silt, clay loam on top and it bluey, slumpy country with deep-seated sliding. It's heavy ground that hangs on well and its beautiful deep soils and a lot of greywacke broken through it. Right out on the spurs it gets a bit lighter again and a bit more peat underneath with your silty loam over it."
F43A23	"ECan has changed all the soil types on us, honestly! So I am going to use the old ones [names]…so we have Temuka silt loams on our heavier ground and lighter blocks are Paparoa fine sandy loam…so we have a nice balance…The policy is as little cultivation as possible...sometimes we plough...we are trying to make sure we have cover crops over the soil in winter to protect it.. there are a number of techniques we use ..they are all about protecting soil structure... I think burning it still a key tool but making sure we are not using it more often than we need to."
F45A33	"All the cropping operation is up here on heavy soils, Temuka silt loams and the dairy farm is a mixture of Temuka and runs out to lighter Lismores… The chemistry target is to keep our pHs at 6-6.2…to keep nutrient availability at its optimum… we keep our Olsen P test at around 25…we do have a copper deficiency on some of our lighter soils…if our sulphur levels are low after a wet winter we will use a bit of ammonium sulphate…we are fussy about our chemistry. I think some farmers are irresponsible with the way they burn [stubble] I am not against burning, there may be an occasion when you need to burn…"
F14D22/1	"It's good Lismores and grows good grass and Templetons, not good for wintering cows…in winter it pugs up like hell, which is why it's a milking platform and nothing on there in winter."

Figure 19 contains representative examples of how soils are described in the narratives of drystock, arable and dairy farmers. Further descriptions are included in Appendix Three. Contrary to the policy advisor's experience noted in Chapter One, all the participants know their soil types: they were incredulous at the notion that any farmer would not know their soils types. F15 said, "I can tell you a story about the history of every paddock." Sikana (1994) when studying soil characterisation in northern Zambia found that farmers have their own way of identifying local soils and land types for agricultural uses, and do not know or use the names given to the soils by agri-scientists. In my research, most participants described both the physical properties of their soils and their scientific names, but they used the names from the Ministry of Works (1967) Land Use Capability (LUC) maps rather than the names in the new Landcare Research S-map series launched in 2002 (www.landcareresearch.co.nz//soils). The LUC system was in use when the participants attended secondary and tertiary education. Participants also said the LUC maps are much more accurate than S-maps. F49 said, "the S-maps are just too broad, it's like using a spray can to mark out a pencil line." F30 said,

> "you show farmers an S-map and they'll simply argue with you and tell you it's not right…they [the farmers] are way more accurate than the map even if they don't know what it [the soil] is called".

The descriptions of soils vary between narratives and this variation correlates with the participants' farming background. The dairy participants classify their soils as either heavy or light and therefore whether there is a potential issue with soil damage by pugging (poaching) in winter. However, the drystock and arable farmers tell much more detailed stories about their soils. The arable participants provide the most detail about soil, describing not only physical and chemical properties, but how they manage soil fertility and the cultivation techniques they use to avoid soil structural damage or wind erosion; all of which are place-specific. Drystock participants also hold detailed knowledge about their soils and the underlying geology and geography of place which has formed them. They demonstrate interest in and knowledge of how place was formed: eg as early as 1845 John Deans 1845 wrote to his father suggesting the Canterbury Plains was "at one time covered in water and that the [Banks} Peninsula was an island…" (Deans, 1964, pp40-41), while F42 explained how the land in their area is a double syncline so the farm next door is seabed but their place is not. Drystock participants describe the fertility of their soils, usually by reference to the soil pH, physical properties, and propensity to erosion.

As well as soil types, the drystock farmers talk about 'country.' Arable and dairy farmers tend to talk about 'soil' or 'land' rather than 'country,' unless they have a background in drystock farming. However, across the narratives of the drystock farmers, I counted over 40 descriptors of 'country,' which are listed in Appendix Three. Dominy (2001, p.138) notes use of the term 'country' among her participants and describes it as a locational reference: "'front country' being near the start of a property and 'back country' at the rear." As well as a locational reference, participants in my research use 'country' as a descriptor of farming landscape. It is essentially a land classification system based on the attributes of place for pastoral farming, from a practical perspective. However they are not terms found in an agri-science textbook; it is 'farming talk.' For example, a hill block may be described as: 'dark country' denoting that it is shaded, wet and cold; 'hard country' meaning it is dry and infertile; 'steep country' meaning it is steep but well-covered in tussock and easy to muster; or 'broken' country meaning it has a covering of tussock and scrub but has rocks and promontories which make it challenging to muster. F47 said that their tourism business is marketed as 'high county' because they are located near the mountains, but in farming terms they are not 'high country.' The hill and high country participants agreed that the term 'high country' describes altitude not location; any farm can have 'high country' if it has country at altitude. Whether 'country' is a reference to location or geography is not pertinent to this research. What is significant is the contextual, experiential language used to describe the environment as a practical farming proposition.

From this analysis of soils and 'country' I draw the following conclusions. The participants in my research know their soil types on farm, though they may not necessarily know the new scientific names for the soils in S-maps, or they might not agree the S-map classification is correct as it applies to place. Secondly, the descriptions of soils and 'country' by arable and drystock participants reveal in-depth, place-specific knowledge. I question whether any soil scientist, environmental planner or other 'expert' would hold as much site-specific knowledge of soils on place and how to farm to those soils, as that described in many of the narratives, unless those experts had been studying that area for many years. Conflict between farmers and environmental planning processes is inevitable if planners or other 'experts' attempt to advise or regulate the soil management practices of farmers who hold this much knowledge about place. F45, a fourth generation arable farmer, summed such conflict up when he said;

"…you know when the [council] auditor comes you are going to have a scrap because unless he knows what he is talking about you are going to spend half the time educating the clown on the difference between farming on a Temuka silt loam and a Whakanui silt loam…."

I am not suggesting all farmers in Canterbury hold this much knowledge about soils. I have already identifed differences in local environmental knowledge between participants in this research. However, it does raise a question; why, where it does exist, is this place-specific, expert knowledge not recognised and used in environmental planning processes?

Figure 20: Descriptions of Weather, Climate & Altitude

F15M23	"[Rainfall is] about 1m – about 750mm this year but usually 900-1000mm…we used to get a lot more north-west rain and the gaps between rains have increased."
F21L 23	"This would be the driest two years we have ever had going by different records and what my grandfather and father would talk about. Of course the 1960s were very dry, that's when they did the county [stock] water scheme. About 36 inches here...we'll get more rain here than 2 mile inland, then you'll get about 40 inches on the coast."
F27L43	"When you look at our rain records our wettest months are Dec and Jan when you get 100mm a month…As a kid, the snow used to be here a lot longer and it was a lot colder…."
F37M33	"685mm but Overseer tells me its 480mm…it does make me wonder about the accuracy of Overseer…Banks Peninsula sticks out like this so if it's SE we get rain and if it's SW we don't."
F40A23	"About 825mm…our rainfall is usually sufficient that we don't need a lot of irrigation…we have sixish weeks that are intensively dry. Its good if that dry is Feb & Mar but it can be Nov & Dec."
F41H12	"The lowest point of the farm is 500m most paddocks are 600m…and we go up to a bit over 2000m..[rainfall] traditionally 1600mm at the homestead…but since 2000 we have been averaging well below that…we've been considerably drier."
F43A23	"Over the last three years we were 399mm… and we are normally a 650mm average rainfall, so over 3 years we have had 2 years of rainfall in the gauge. The Selwyn River is fed by aquifers, take 650mm out of the system and I'm surprised it hasn't gone drier sooner."
F44M32/1	"Frost can wipe you out [grapes] or that hail last year …so frost becomes a dictator in your life…we've learnt there are all sorts of frosts…a frost travels like a braided river…if there is an area which is flatter or sheltered…it will settle as in a pond...it's fascinating."
F45M33	"Canterbury weather cycles seem to be bound to 35-year cycles in terms of droughts, floods and big snows….Most farmers unless they have been on the same property …don't have that historical understanding… I said to a neighbour this is the worst flood since 1978. He tried to argue…and I said how do you know you weren't here in 1978? And the worst flood before 1978 was …1945. I have been told about the flood in 1945 but I wasn't here, I am not that old."
Andrews	"…persistent droughts plagued the land around three times in every 10 years…a major flood occurred around every 10 years" (undated, p.6).
Menzies	"There are wet cycles and dry cycles of varying numbers of years, with a really serious drought 4 or 5 times a century. The land has become drier than it was as springs and bogs slow, but this is due to clearing, stocking and consolidation and not so much to climate change" (1970, p.64)
Wright	"The NW wind did cause havoc at times…blowing [hay]stacks down & sheaves off the drays (1992, p.9)…Wind and Waimakariri river silt seem to be the hallmark of Mountainview…Farming traditionally has been arable & with the aid of the NW wind has provided the medium in which we can grow profitable cereals, small seeds & potatoes" (Ibid, p.14).

The quotes in Figure 20 demonstrate that participants have detailed knowledge of weather patterns on place and how they have changed over time. Weather conditions have a major impact on farming and feature prominently in the narratives of arable and drystock participants. F44 made the comment, "I think we naturally know about weather [because] as farmers we are outside all the time" and dryland farmers are admired for their ability to predict and respond to weather patterns. Irrigated farming is considered

easy by comparison, almost 'cheating.' However F43 said weather has a huge influence on arable farming even with irrigation, because rainfall, wind, frost and temperature all affect plant growth. The participants keep accurate rainfall records and know different 'types' of rain, snow and frost. The quotes from F45, F46 and Andrews (undated) about flooding and drought demonstrate the value of historical knowledge about weather events and how they affect place. Major events in the farming life-story are placed in time relative to significant weather events, they act as temporal signposts and memory triggers, eg droughts, floods, and snow storms in 1992, 1973 and a collective, handed-down memory of 'the Big Snow of 1945'. F38 told of how the snow of 1973 changed their thinking of how to farm place: "that cost us half the sheep and ¼ of the cattle, so it required a major rethink." Menzies (1970, p.141) wrote:

> "Drought, snows and floods come to test each generation. You can't doge them but you can temper their effects by always having a proportion of the stock carried in marketable condition…we have learned, too, to have some reserves of stored feed to fall back on."

Holland (2013) claims that weather was the most frequently identifed environmental issue in the farm diaries and records of settler farmers in Southland and, over time, their descriptions of weather increased as they acquired local environmental knowledge. In my research, the narratives of drystock and arable participants include detailed descriptions of weather patterns and stories about the impact of major weather events on their farming knowledge and practices. F43, an arable farmer, suggested that, "with sheep and beef and arable [farming] you are at the whim of the weather; the weather doesn't seem to affect dairy much, may be more in the North Island [where there is no irrigation]?" Except for F35, none of the dairy participants mentioned rainfall or weather in their narratives but they all spoke about their irrigation systems and reliability of supply. F35 said,

> " weather plays such a big part in how we farm. You might have one year that is fantastic weather, one that's a drought and one that's really wet and it's not until you've been through all these different experiences that you learn how to really prepare for the next one…"

The use of irrigation in farming is discussed in Chapter Five.

Despite the Canterbury-born participants having intimate and detailed knowledge of weather patterns and changes in weather patterns on the family farm, 'climate change' is not discussed, other than a passing comment by F15 and F27 around the benefits of milder winters. However, Holland (2013, p220) cautions that in analysing text, "absence of evidence is not evidence of absence" and the quotes in Figure 20 suggest participants are aware of how weather patterns are changing over time. McLintock (2018), in her study of perceptions of the impact of climate change on farming among mid Canterbury farmers, found varying levels of interest in and concern about climate change, with dairy farmers the least concerned. Kenny (2011) studying dryland farming practices on the east coasts of both the North and South Islands, suggests farmers are adapting to improve their resilience to climate change. It may be participants in this research do not consider climate change as a separate issue from weather generally, and F38 and Menzies (1970) use the term 'climate change' when referring to a history of changing weather patterns over time. If so, this example reinforces the notion that meaning is contextual, a theme which is explored further in analysing conflict between participants and the environmental planning process in Chapters Seven and Eight.

4.4 Conclusions and Reflections

This chapter is the first of three chapters interpreting and analysing how participants understand the family farm, how they understand farming, and how they acquire farming knowledge. These themes are explored because they demonstrate ontological understandings of the human-environment relationship and ways of knowing, which are key distinguishing characteristics of different ways of knowing depicted in Figure 5 (p.30). All participants share: an understanding of the family farm as place; a place-attachment relationship to the family farm as home and for those who farm where they were born, identity; and a desire to remain in place. How the participants know and relate to place varies, and I have distinguished between the narratives of arable and drystock participants as narratives of 'people in place' or 'with the dirt', and those of the dairy participants which I describe as narratives of 'production in place' or 'with the shed'. In addition, the degree of attachment to place and knowledge about place varies relative to longevity in place. Irrespective of these nuances, the participants' narratives are all narratives about place, and people's place within place. The question 'tell me about the farm' is a synonym for 'tell me about you?'

Before undertaking this research, I was aware of the notion of place-attachment among intergenerational family farmers in Canterbury, but I assumed it was particular to the sentimentalists among us! However this research suggests the family farm as home is a conceptual understanding shared between all participants, including those who have moved from the original family farm. None of the participants spoke of the family farm as a land resource to support a generic activity called farming. This farmer-farm relationship differs from an understanding of land as solely a utility for commodity production, expressed through a subject-object dichotomy. However, there are variances within the narratives over the extent to which the family farm is identity. Like Turner (1983), I found expressions of kinship with land and nature in the narratives of the Canterbury-born participants. However those sentiments are not expressed so strongly in the narratives of the North Island-born participants, suggesting the relationship with place as identity may be linked to longevity in place. I cannot conclude that the participants' way of knowing the farmer-farm relationship is kincentric or singular in the way MacGregor (2004) describes Australian aboriginals, they are the land'. However there appears to be a shared understanding of the family farm as home and, as Jim Morris' describes in his poem *To The Rakaia* (undated, p.16), "…A fair-sized part of me."

The family farm and nature are described as independent entities existing in their own right, characterised, personified and, in the case of nature, feminised. The participants know the family farm and nature from farming place, and they know the activity of farming in the context of farming place. The family farm is described as the interaction of interdependent systems of natural capital and socio-economic capital, in place. Dairy participants focus on socio-economic capital when describing the family farm, while arable and drystock participants focus on natural capital. The distinction is significant to my research because it suggests the presence of two ways of knowing nature among the participants: one of nature alongside but separate from 'production land' which aligns with approaches to managing conservation values in the environmental planning process; and one of nature as an integral part of farming place, which aligns more closely with indigenous TEK. This notion is explored further in analysing how participants undertake farming in Chapter Five and the case studies in Chapter Seven.

The drystock and arable participants provide comprehensive and detailed knowledge of their local environment in their narratives, including discussions of soils, landscapes and weather patterns and how the latter have changed over time. However the narratives of the dairy participants focus more on the socio-economic capital of the family farm, indicating that participants have different farming knowledge and foci depending on their farming activity, background and longevity in place. These differences are significant, not in terms of being 'right and wrong,' but in their difference. Different ways of knowing farmer-farm relationships and knowledge create ontological challenges in an environmental planning process grounded in an understanding of knowledge and farming as conceptual and fixed. Firstly, the place-specific nature of farming challenges the degree to which farming-related environmental issues can be properly understood and effectively managed at a conceptual or generic level in an environmental planning process. Secondly, there is a reservoir of complex, experiential and contextual environmental knowledge held among the research participants, but this expert knowledge is neither recognised nor used in environmental planning processes. Finally, there are different ways of knowing and doing farming, in Canterbury, some of which better align with the environmental planning process than others. This creates a challenge over the extent to which conflict can be reconciled when reconciliation is not a matter of replacing one universalising environmental management system with another. Rather environmental planning processes have to recognise and reconcile with multiple farmer-farm relationships and farming knowledges.

CHAPTER FIVE Farming as Being in Place

"Farming in the Bay has always tended to be a family affair and a way of life rather than a business venture" (Menzies, 1970, p.159).

"Farming isn't a job – it's a passion, it's a way of life" (F25L13).

5.1 Introduction

This chapter is the second of three chapters that articulates the participants' farming culture and ways of knowing. In Chapter Two, I argued that a key assumption underpinning agri-science and environmental planning literature in New Zealand is that farming is the commodity production of food and fibre. The quotes above from third and fifth generation family farmers suggest that, for some farmers, farming is not understood solely as an economic activity: it is a way of life; it is cultural knowledge. This chapter interprets and analyses the participants' understandings of the activity of farming, including the role of economic and environmental values. How participants enact farming is pertinent to this research for two reasons. Firstly, how the participants farm indicates their ontological understanding of farmer-farm or human-environment relationships. Secondly, as discussed in Chapter One, farming is portrayed in environmental planning processes in New Zealand as an 'economic versus environment' proposition, and the crux of this research has been to question that proposition as it applies to non-indigenous intergenerational family farmers in Canterbury.

Morris et al (1995), Jay (1999, 2006, undated) and Stock and Peoples (2012) have all undertaken research which suggests that dairy farmers generally, appear more overtly oriented towards production than other farmers, and this section discusses the participants' perceptions of dairy farming. Sections 4.2 to 4.4 explore in more detail the economic, environmental and socio-cultural factors that together constitute the participants' understandings of farming as an activity. Figure 11 (p.70) illustrates the link between the family farm as place and the activity of farming, and how this interaction creates farming knowledge. The participants' understandings of the family farm as place were discussed in Chapter Four, and Chapter Six interprets and analyses how the participants acquire farming knowledge and make decisions. As noted in Chapter Four, the three chapters ought to be read in conjunction.

Figure 21a (p.93) cites some participants' descriptions of the activity of farming or their 'farming philosophy'. Figure 21b (p.93) provides examples of how non-dairy participants describe dairy farming. The descriptions of farming in Figure 21a suggest that all the participants share a similar understanding of farming, being a balancing of economic, environmental and socio-cultural factors with a long-term or intergenerational focus. By contrast, the quotes in Figure 21b show that the non-dairy participants perceive dairy farming as focused on short-term economic gains at the expense of environmental values, animal welfare and other people. These participants blame dairy farming for additional environmental regulations on all farming in Canterbury, and for creating negative public perceptions about farming.

Figure 21a: Participants' Comments on Farming as an Activity

F16L42	"We are in control of the environment and the environment controls us – same thing. What we try to do is play along the lines of helping nature and enhancing the property and enhancing the land for the generations which are going to follow."
F30L23	"When I hear people say we want to feed the world, that makes me cringe…[it] implies we have a responsibility to pump out as much product as we can with not much regard to the environment. Part of us being successful is being able to look after our environment and to communicate that…."
F47L43	"Being able to look after the stock, turn a profit, have healthy animals and be sustainable environmentally and business wise. You have to be an all-rounder…"
F43A23	"There has been crop on here for well over 150 years and I guess from a sustainability point of view…it is still producing good yields. I think it's a good argument for what sustainability is."
F24D23/1	"I think I am a farmer who draws an income off the land and I don't want to stuff it up…if someone tells me I am doing something wrong and it's proven, I want to sort it out…the environment is important to us. I want to be able to leave it in a better state for my children...."
F31D43	"I wouldn't say we are at the top end of the Greenie status, but we are environmentally aware of what we do and love living here. I want to farm successfully and look after the environment; I want to be one of those people who does that [not] just talk about it."
F46D23/1	"My farming philosophy has always been about respect and…love of farming…not just money."
McLeod	"I have not ignored the economic limitations of high country run-holding in this book but tried to portray the compensation which life among such magnificent surroundings provides, and the deep gratitude I feel…to stride the mountain tops…"(1974, p.12).

Figure 21b: Non-dairy Participants Perceptions of Dairy Farming

Drystock	"The perception is that it [dairy] is cranked up to the hilt…perhaps they do need to pull back a bit…lower intensity, better animal welfare, better perceptions…Cows that deep in mud; we'd be taking ours [beef cattle] off and saying we can't put them on there. The other thing that worries me is the resentment in the non-dairy sector…they are starting to say we are going to be put through the bloody ringer because of you...."
Drystock	"To me dairy farmers are happy to increase their production by $1 even if it costs 99c to do it. That's ridiculous...Fish & Game started their 'Dirty Dairy' campaign and the dairy industry put their fingers in their ears and grew as fast as they possibly could…and Fish & Game were right."
Drystock	"They're wiping out all the trees and because of that perceived monetary gain we are going to lose a lot more territory to that monoculture…The change in land use has been massive and to me it's a disaster…."
Arable & Drystock	"The last generation planted the trees and this generation has chopped them all out…It's an awful environment in the winter, the nor-west wind and the rain and sometimes they look so sad, the cows, all standing in a group and in the mud too. That's dairy farming and we aren't part of that so we probably can't comment."
Arable	"If you buy a cheap resource [light land], get another free resource [water], exploit the two things and put the highest environmentally unfriendly use on that land, what can you expect?"
Arable	"Look it annoys me how some dairy farmers behave. I can't come out and say that, but it does… you can't have 500 cows standing knee deep in mud on fodder beet grazing a 1m wide strip. But...they have such high debt structure that there isn't any head room to change… I don't know how we resolve it without the rest of us being collateral damage."
Arable & Canterbury Dairy	"When the dairy boom came, a lot of people came from Taranaki and Waikato down here and they were awful people to deal with…They were very driven by production and are a lot more financially focused…a lot of farmers won't deal with dairy farmers unless they know them."
Canterbury Dairy	"They are not like us; they are a breed apart…There are some very hard-nosed farmers in the dairy industry. They tend to be young fellas who are working their way up the ladder…every dollar counts...In our background of farming we are not used to dealing with people like that…we tend to be much more word of mouth agreements, easy going and give and take…."
Canterbury Dairy	"A few years ago when I thought about dairy farmers I thought of them as very selfish, all they want to do is milk and make money and don't really care about anything else…I am not sure where that came from…but as a sheep and beef guy looking over the fence that's the impression I got. Now I have got to know some dairy farmers I realise they are in the same boat as everyone else and all they want to do is get on and make a living."

In Chapter One I suggested that farmers do not publicly criticise dairy farming in Canterbury, even when they perceive it as the cause of additional environmental regulation on and negative public perceptions of, all farming. The quotes in Figure 21b support that observation. When I discussed this issue with my participants, their responses varied. There were participants from all farming sectors in the feedback session held at Coalgate and I could not engender any discussion about people's perceptions of dairy farming or whether dairy farmers have different farming ethics and foci from drystock or arable farmers. This response reinforced to me that the criticisms of dairy farming relayed to me were told within the trust relationship of this research and would not be repeated publicly, at least not with dairy farmers present. However at the Waipara feedback session there were no dairy farmers present and the non-dairy participants were forthright in their views that dairy farmers are heavily focused on profit at the expense of other factors. One farmer at this feedback session went so far to suggest that the dairy farmers who partook in my research and shared similar values with other participants, "…cannot be representative of dairy farmers in Canterbury."

The participants in the Christchurch feedback session were a mix of drystock, arable and dairy farmers but all have held leadership roles in farming organisations and were interested in teasing out this issue. The general consensus among this group was that dairy farmers have a harder focus on the economic aspects of farming, which is consistent with my observation in Chapter Four that the dairy narratives centred on socio-economic capital and 'production in place'. F05 thinks this harder economic focus is a result of the share-milking scheme introduced into New Zealand in the1960s. He posited that share-milking has enabled people to enter dairy farming with substantially less capital than is required in other farming sectors. Consequently, while young farmers in other sectors may have family debt, dairy farmers are more indebted to external lenders, so they focus more on budgets, financial performance and debt-servicing. F32 agreed, saying as a young dairy farmer his level of indebtedness means he does things, "…which do not sit well with me environmentally and ethically but are cheap, like feeding palm kernel." Le Heron (2018, p.17) argues that high debt to equity ratios in dairy farming in New Zealand have been a principal driver of dairy farming performance. Also he argues that despite dairy contributing about $90b in export earnings over the last decade, high debt levels mean this growth has not added a lot of return of any value to New Zealand farmers (Ibid, p.20). Jay (undated, p.291) suggests that the broader dairy industry contributes to this focus on production in dairy farming,

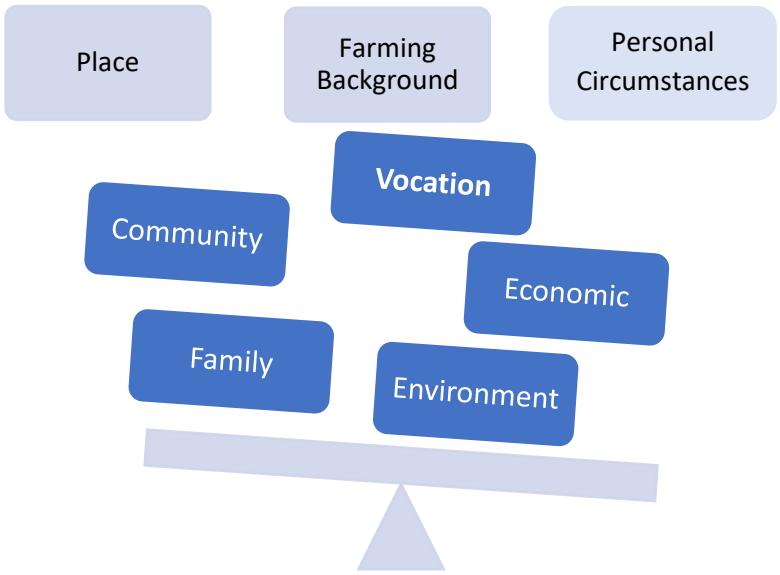
> "While farmers are constantly encouraged to increase milk production and productivity, there is little positive incentive to improve their environmental performance. Instead the incentive tends to be negative."

The role of economic factors in farming is interpreted and analysed in Section 4.3.

Figure 22 (p.95) presents a diagrammatic representation of the activity of farming as described by the participants. All participants describe their farming activity as balancing economic, environmental, and socio-cultural factors - being personal, familial and communal influences. The management of these factors is shaped by each participant's farming lens, which is determined by the place they farm, their farming background, and their personal circumstances, including fiscal circumstances. Participants affirmed in the feedback sessions that this description of farming as an activity is a fair representation

of how they farm though, as aforenoted, the non-dairy participants did not agree it is an accurate representation of dairy farming in Canterbury.

Figure 22: Farming as Balancing Economic, Environmental and Socio-Cultural Values in Place



Considering the comments on dairy farming at the Christchurch feedback session noted above, I have concluded that Figure 22 is a fair representation of how all the participants in the research describe their understanding of farming. However, how each participant manages the interaction of economic, environmental and socio-cultural factors is place and farmer-specific. To that end, Morris et al (1995, p.76) argue that 'high production-oriented' dairy farmers in their research did not farm in radically different ways from other farmers rather, "…it appears to be more a matter of degree." The role of economic, environmental and socio-cultural factors in farming is interpreted and analysed in the next three sections.

5.2 Farming as an Economic Activity

Non-indigenous intergenerational family farming is an economic activity: it involves the use or husbandry of natural resources in place to generate income. As noted in Chapter One, the primary sector is historically (and contemporaneously) a major contributor to New Zealand's economy and participants are proud of that legacy. However the economic aspects of farming described in the narratives do not turn on maximising short-term profit nor on maximising production. Rather, all participants have two economic goals: to produce consistently high quality products; and to make sufficient income to remain in place. Despite differences in the focus of narratives between socio-economic capital and natural capital discussed in Chapter Four, all participants described farming as an essential social activity rather than an optional economic activity, and all participants demonstrated shared understandings of the key economic factors in farming.

First and foremostly farmers feed people, which the participants regard as an essential and noble occupation undervalued by urban New Zealand. F37 described family farmers as the strength of the New Zealand economy not because of the wealth they generate but because, "…they can survive the downturns" which is vital when producing food. I did not ask participants about public perceptions of farming, but every participant mentioned their concern that New Zealanders have forgotten that farming feeds people. In a recent North Canterbury Federated Farmers Provincial newsletter, family farmer Tracey Sandbrook (2019, p.3) said, "Dairy farmers feed people: it's as simple as that. Sometimes I think that gets overlooked – both by those making policy and by us as we farm." In the feedback sessions at Coalgate and Waipara participants discussed whether they should call themselves 'food producers' rather than farmers to remind the public what farmers do.

Figure 23: Economic Factors Discussed by Participants

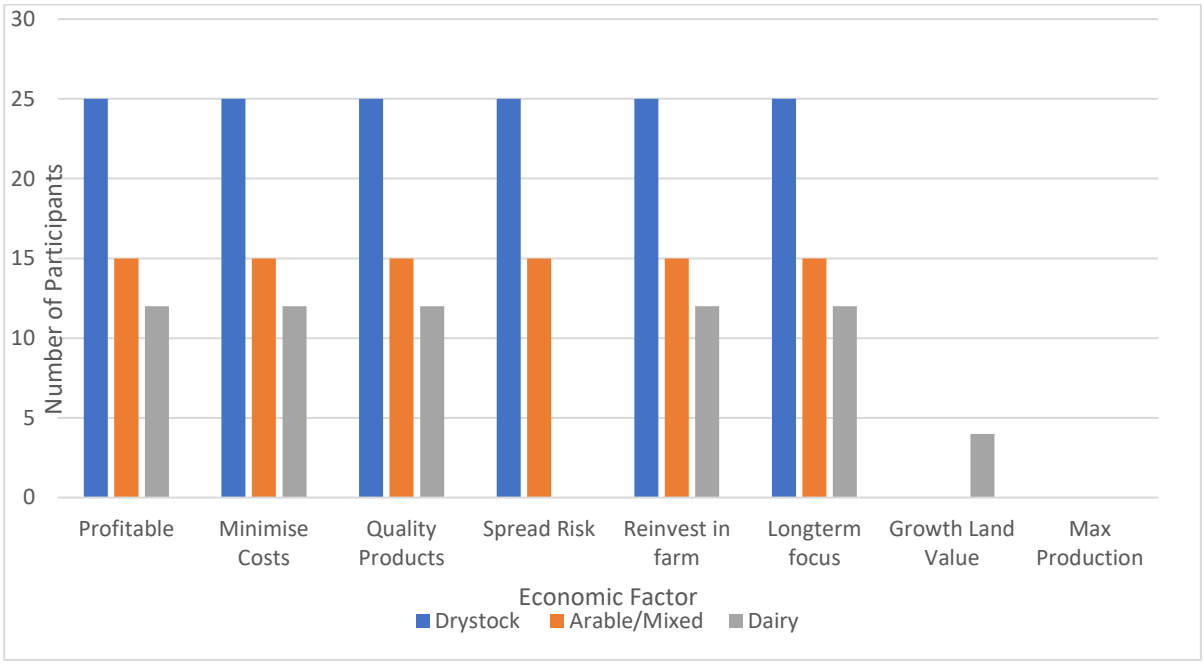


Figure 23 depicts economic aspects of farming described in the narratives, categorised by the type of farming the participants do (25 in drystock including high country; 15 in arable and mixed farming; and 12 in dairy). Statements in the narratives about economic aspects of farming are listed in Appendix Five. As Figure 23 shows, the same economic factors are described by all participants as important in farming, except for increases in land value and spreading risk. Four dairy participants identifed increase in land value as important whereas other participants did not. Rather, F40 and F47 said they would prefer to have twice the income and no capital gain because capital gain is only valuable if a farm is for sale. This difference is consistent with Le Heron's (2018) observation about dairy farm indebtedness, cited in Section 5.1. Spreading risk was not mentioned as important by dairy participants. This difference is consistent with Morris et al (1995) observations of the role of income diversification in the farming systems of arable and sheep and beef farmers in the Temuka/Geraldine area compared with dairy farmers.

In Chapter Four, I noted that the primary goal of the participants is to remain in place and the first economic factor identifed by all participants is that farming needs to be profitable, and profitable is described as generating sufficient income to remain in place. Participants said the family farm will not make a profit every year but there needs to be sufficient "good" years to remain in place. Pawson (2018, p.183) found the farmers who established Banks Peninsula Farms had similar objectives, "the group's purpose is to attain more assured and better returns so that the chances of intergenerational persistence are enhanced…" and Morris et al (1997, p.47) suggested that, "…the overarching aim of them all [participants in their research] is to be able to stay on their land and to continue to farm and live in the high country." Maximising short-term profits can be detrimental to the long-term goal of remaining in place if those practices exhaust soils, generate overly heavy workloads, or rely on high levels of farm inputs which may not be economically viable to use when commodity prices drop. F17 said,

> "it's a question for all farmers, are you ultimately driven by taking the biggest profit you can or by long-term prospects and taking into account environmental issues and the next person who is going to farm your property?"

The goal of remaining in place is achieved by a combination of four factors shown in Figure 23: undertaking a land use that can be sustained long-term including when commodity prices are low; minimising farming costs; producing good quality products; and, for arable and drystock participants, spreading risk by having a range of income streams with different levels of risk and reward. For example, arable farmers plant a range of cereal, vegetable and specialist seed crops. Morris et al (1995) identifies risk minimisation and fiscal prudence as some of the 'orienting principles' that determine whether farmers adopt new technology on farm. Similarly, Berkes (2018, p.51) observes the reluctance of indigenous farmers to adopt monocultures of high-yield crop varieties and notes that such practices are interpreted by agri-scientists as 'risk-aversion'. This is an example of different ways of knowing farming: the aim of the agri-scientist is to increase production; the aim of the farmer is to remain in place by minimising risk. To that end, Drinkwater (1994, p.39) observes:

> "…a scientist who automatically assumes that a farmer who does not use higher yielding varieties and recommended methods is backward, inefficient and ignorant is not going to learn much about that farmer's situation. On the contrary, a person who sees production activities as the outcome of physical, social, economic, institutional, as well as technological and cultural factors, is more likely to grasp the 'why' of a farmer's actions."

Part of sustaining a farming system long-term involves prioritising expenditure, and the priority for expenditure is the three things which enable production, soil fertility, pasture quality and fencing; sometimes referred to as the 'three Fs'. The second priority for expenditure is essential farm infrastructure such as water systems, yards, and access tracks. Fernyhough (2007) records one of her mistakes at Castle Hill was spending too much money on buildings and not enough on the 'three F's'. She fits the description of a 'farm developer' which F34 and F52 describe in Chapter Four as 'lasting five years.'

A long-term focus and conservatism in land use were also common factors identified across the narratives. Dynes et al (2010) claim that New Zealand farmers have always chased the highest

commodity prices, but F47 argues intergenerational family farmers are conservative about change because they have something to conserve. F24 observed,

> "all farming is cyclical, if someone said all the money is in beef or deer or kiwifruit or whatever it might be, by the time you get set up in that industry, that's on the decline and the one you left is going up, so you miss out in every way. As I look at it, with most types of farming, if you enjoy it and are good at it, then over a 10 year period it's been okay."

However, when the commodity price falls to a point where farming no longer generates sufficient income to remain in place long-term, the participants have and do change their farming systems. The drystock participants refer to the 1950s when wool was '£1- 1lb,' and the family having to shift their focus to lamb production as global demand for wool dropped in favour of synthetic fibres in the 1970s (F03, F06, F07, F16, F26, F28, F41, F50, F51, F53). Similarly, arable farmers tell of supplementing cereal crops with vegetables and specialist seeds as the price of wheat has fallen (F04, F15, F17, F18, F33, F43, F48, F49). F53 told the story of how some Banks Peninsula farmers have banded together to create their own handmade rugs under the brand 'Banks Peninsula Farms' to improve their income from strong wool. That story is included in the new Biological Economies Team research (Pawson, 2018b) noted in Chapter Two, along with other examples of farmers and growers responding to the collapses of traditional commodity markets for New Zealand produce by reconfiguring and remarketing niche products grounded in the farming story of product quality, place-attachment and environmental ethics.

While dairy participants spoke more about socio-economic factors in describing farming than arable and drystock participants, no participants describe in detail their farm finances. The only financial disclosure of this nature was a comment by F14 about his mortgage. This silence did not surprise me with drystock farmers because I know from my own background that they do not talk about money. That this silence is shared with the dairy participants did surprise me given the literature on the economic focus of dairy farming (Jay 1999, 2006, undated; Le Heron 2016, 2018) and my own observations about the focus on socio-economic capital in the dairy narratives. When I asked about this silence in the feedback sessions F51 said, "most farmers have budgets in their heads, they know what the farm can do." Similarly F15, said, "I don't do hard budgets for anything. I focus more on how the farm operation fits together and if I get it right the finance looks after itself." It occurred to me that when family farmers buy or sell farms, the financial records of the previous farmer are neither sought nor offered. Rather the participants work out what a farm can produce and decide if that will work fiscally for them. F06 said,

> "You don't work out how much money you need to make and therefore how many sheep you need to run, you work out what the farm can run [in stock units], divide by 80% [of the stock units] and go from there."

The participants' 'fiscal language' is describing either the natural or socio-economic capital of place as key indicators of production potential depending on whether production is 'with the dirt' or 'with the shed', as discussed in Chapter Four.

While the participants do not talk about farm finances, all participants share a perception of debt as the most significant threat to the ability to remain in place. Many participants carry collective social memories of hard fiscal times and of families who lost their farms in the Great Depression or the agricultural reforms

of the 1980s described in Chapter One. This collective memory creates a cohort of farmers who are cautious in borrowing and wary of debt. Andrews (undated) wrote of his 'lucky escape' in not taking his accountant's advice and borrowing money for irrigation in 1985 when interest rates rose by around 15% and commodity prices plummeted. F51 told of neighbours who lost their farm in the Great Depression after they had borrowed money, "Father always said to me, 'it isn't what you own Robert, it's what you owe' and that's why Ashley Gorge is still in the Johnson family." Similarly, F20 said the first thing he thinks about when making any decision is 'don't lose the farm.' Morris et al (1995) made a similar observation that one of the 'orienting principles' determining the conservatism of farming in Temuka/Geraldine, was whether participants had been farming during the agricultural reforms of the 1980s. F48 thinks he has a less conservative view of debt than most family farmers but says his own son is much more conservative about borrowing, a conservatism F48 attributes to his son's place-attachment.

The narratives link farm income with environmental management. The first goal is to remain in place and if debt levels are high then farm management is focused on producing income to service debt. Jay (2008) argues that long-term sustainable farming practices may be pushed aside to meet immediate financial needs and Le Heron (2018) argues debt reinforces conventional farming systems because they are the farming systems banks will finance. In section 5.1, I noted F32's comment that as a young dairy farmer with high debt there are some practices he does because they are cheap. Similarly, F15 said it has only been in the last 10 years he has reached a financial position that allows him to set aside funds for environmental management. F14 talked about his new dairy shed which uses 35% less water but noted that he was at a stage where he could afford to invest in that. I argue this link between fiscal circumstance and environmental management is overlooked in agri-science and planning literature. As discussed in Chapter Two, the presumption in the literature is that younger farmers are better environmental managers because they use more agri-science technology and are more aware of environmental issues (Morris et al, 1995; Brown et al, 2015; Miller, 2017). However, these narratives suggest that more established farmers have more resources to devote to environmental management and more fiscal flexibility to change farming systems.

5.3 Farming as Environmental Management

The participants describe farming as in-situ environmental management in Figure 21a (p.93) and this section interprets and analyses the role of environmental factors in farming. The participants describe farming as a reciprocal relationship between farmer and nature, illustrated in the quotes in Figure 24 (p.100). Berkes (2017, p. 99) notes similar expressions among Fihian naua (indigenous Fijian people) with expressions such as "ne qua nanua" (the land which supports me and to which I belong). A similar sentiment is expressed in the Ngāi Tahu pepeha (proverb) "toitū te marae o Tāne, toitū te marae o Tangaroa, toitū te iwi" (protect and strengthen the realms of the land and sea and they will protect and strengthen the people) (Ngāi Tahu ki Murihiku, 2008, p.172). Dominy (2001, p.196) describes the 'farming philosophies' of her participants as, "…boxer shuffle with rather than against environmental processes over which farmers have little control."

Figure 24: Expressions of a Reciprocal Relationship with Nature

F06L22	"What is best for the country is probably what is going to be best for us too, quite simply."
F19D33	"You need to be in tune with nature to be a farmer, you need to be in tune with your animals…If you farm against nature, she will bite you in the bum."
F21L23	"We have to know how nature works; we are working with nature all the time."
F30L23	"I am philosophically wanting to do the best for the land because that's what looks after us but it's not sensible to rule products out just because they are not natural…."
F37M33	"You are trying to work with nature & the more you can work with nature the better you are."
McRae	"A man (sic) cannot possibly do all that should be done each year for his land; and yet that same land will never let him forget what he owes to it" (1968, p.117).
Roberts	"Taking the long view of the land question, there never was adequate provision made for the fact of our lands being our livelihoods…there has been a great deal said of the mining of farm lands, and a deal of it is true, but unfortunately it was true of necessity" (1946, p.84)

Descriptions of farming as a reciprocal relationship with nature are not as apparent in the narratives of the North Island-born dairy participants. That silence is consistent with my observation in Chapter Four that dairy narratives are more 'with the shed' than 'with the dirt' and wild ecosystems are separated from the farm as 'protected land' rather than an integral part of the farming system. Similarly, all participants speak of the importance of environmental management in farming, but the narratives describe different ways of knowing and doing environmental management. This section interprets and analyses how participants describe the role of nature or environmental factors in farming, considering two examples: matching land use and natural capital; and farming with wild ecosystems.

Matching Land Use and Natural Capital

Figure 25: Examples of Matching Land Use with Natural Capital

F02H23	"Fattening lambs you want nice, warm country to grow decent feed so you can get them away. Warm country is important. You've got to match the land with what you want to do."
F06L43	"We don't do dairy grazing which would make more money because if you put dairy cows on the hills you would wreck it all…."
F15M23	"At Sinai I could only run stags because of the climate whereas here I could run hinds. It's about using the land to its advantages, not forcing it to do something it doesn't do very well."
F17A42	"The farm is coastal and heavy soils and we have to farm accordingly, so we don't venture into dairy grazing or heavy stock…we just get too wet in winter time…"
F27L43.	"You've got to follow the grass curve…grass doesn't grow again until August…[so] we grow good swedes. We watch the neighbours grow kale…then it snows and it [kale] flops."
F39A43	"We knew this land did not lend itself to dairy, it is too deep [soils], too rich…We under-cultivate our paddocks due to the weather and soil conditions…[otherwise] a nor-wester comes in and your paddock is over at your neighbours."
F45M33	"I have a fundamental principle about using milling wheats that have Mexican or Spanish breeding in them… [they are] more drought resistant and they tend to finish early which suits our climate."
F48A22	"We are on a soil type that doesn't blow and we have impeded drainage …but if you are down at Rakaia where it is sandy, I've [seen] the sand cut a paddock of onions off at ground level …its horses for courses."
Menzies	"There were not many possibilities for diversification in the Bay. Limited supplies of water and low rainfall make extensive cattle farming out of the question…This locality is marginal for dairying…"(1970, pp.142-143).

A key concept discussed by arable and drystock participants is ‘farming to natural capital.’ Natural capital is described in Chapter Four as the natural resources and physical attributes of place that enable farming and determine the type of farming most suited to place. Figure 25 (p.100) provides examples of matching land use and natural capital described in the narratives. The arable and drystock participants believe that matching land use to natural capital results in farming systems which require fewer inputs and have less environmental impact than farming systems which attempt to modify the local environment to suit the land use. Similarly, Kenny (2011) argues that knowledge-intensive, low-input farming systems are more resilient to climate change. Dairy farming on lighter, free-draining soils in Canterbury using high inputs of fertiliser and irrigation water is criticised by the non-dairy participants (F02, F03, F06,F08, F09, F15, F16, F17, F18, F21, F29, F30, F33, F34, F38, F39, F40, F41, F42, F43, F45, F47, F49, F50, F51, F52 & F53) as not matching land use with natural capital, though F22 notes it does improve topsoil over time. The Canterbury-born dairy participants also discuss how their soil types suit dairy farming because the soils hold moisture: they require less irrigation and have less propensity for nitrate-nitrogen leaching than lighter, free-draining soils. This approach to dairy farming by selecting appropriate soil types may reflect local environmental knowledge from longevity in place and/or it may be because those participants all have experience in arable farming, which is discussed in Chapter Six.

The North Island-born dairy participants do not talk about matching land use with natural capital as a concept, though F23 and F24 both talk about having lighter cattle breeds such as Jerseys or Ayreshires on heavy soils in Northland to reduce soil damage. In a Canterbury context, the participants describe using agri-science technology and ‘good management practices’ (GMPs) to address environmental issues, for example: reducing water use by upgrading to centre pivot irrigators and installing soil moisture probes; and reducing sediment run-off by fencing off waterways and planting riparian margins. The North Island-born participants spoke of their belief that agri-science will develop techniques to manage nitrate-nitrogen leaching which is discussed in the case study on freshwater in Chapter Seven. Le Heron (2018, p.36) refers to this approach to environmental mitigation as ‘single-issue-focused’ and relying on ‘end-of-pipe’ technologies which may mitigate the environmental impact but does not address the underlying factors that enable the farmer to adopt the practice in the first place. It is reminiscent of Howitt’s (2001) and Bromley’s (2004) arguments noted in Chapter Two, of an environmental management system which is reliant on science and technology to address the very problems created by applying science and technology to resource use. Bromley (2004) argues this approach reflects an underlying political ideology committed to a notion of ‘progress’ as the continuous application of scientific reason to understanding the natural world, and using the knowledge generated to build technologies to control the natural environment.

Using agri-science technology to mitigate environmental impacts of farming is an approach to environmental management that fits well with the environmental planning process. The RMA (ss9-15) separates the environment into ‘natural resources’, eg land, water and air; and human interaction with the environment is classified into various ‘activities’ which are acted upon natural resources, eg land use, water take, discharge of a contaminant to air. Each activity and each natural resource are managed separately, with regional and district councils having functions to manage different natural resources as noted in Chapter One (RMA, ss30-31). Also, I noted in Chapter One that the environmental planning process favours ‘expert’ knowledge held by scientists with formal academic qualifications in appropriate

scientific disciplines. Therefore the environmental planning process lends itself to 'single-issue' environmental management using of 'end of pipe' technology developed by agri-scientists.

Figure 26: Descriptions of Role of Irrigation in Farming

F15M23	"We are reasonably reliable for rainfall up here, so we are only bridging small gaps as a rule…some paddocks do not need to be watered."
F17A42	"My father farmed…without irrigation quite successfully with the heavy land, but we felt that heading into the future with the crops available…we needed irrigation."
F22A23	"About 15 years ago we reinstated a lake from which we irrigate about 70ha …our land is pretty good, deep soils and a little bit of water…we don't use much with cropping."
F33A23	"Peas do not need a lot of water compared with cereals…that's what bugs me with dairy farmers, they don't stop watering…with cropping you are finished watering in December."
F43A23	"We've been irrigating here for about 45 years...which is ironic because we are on heavy ground but…our groundwater is so shallow it is cheap to put a pipe in."
F29L43	"[The irrigation scheme] comes through the middle of the farm…so if we hadn't irrigated we would have been stupid. There is a mindset that you can't do anything else than milking cows… but it's got to be right for the environment."
F38H33	"The risk with high country is… winter can be 150 days in a bad year …what we can't risk is another 100 days of no growth in the summer…."
F11M43	"I thought with irrigation…livestock, crops, vegetables. I never thought of dairying…we all thought Canterbury was too dry and would take too much water…."
F44M32/1	"In a severe drought you know that you can still have something out on the centre pivot, but we are not entirely reliant on it, we've farmed without it."
F14D22/1	"It's got to be irrigable [land] as that is the only thing that works in Canterbury…."
F23D23/1	"Irrigation [makes the difference] you can grow grass on the shoulder of the season and get through that dry summer. For us… coming to Canterbury… was irrigation and scale."
F24D23/1	"Irrigation is the draw card [in Canterbury], being able to be away from heavy clay soils to more free-draining soils…Irrigation is like your left leg for us…."
F32D13/1	"We had water for 140ha and we put irrigation infrastructure on for 175ha and thought we'd make it stretch and for the first two years it did…[then] we discovered [it] wasn't going to be enough…I think it was naivety about what irrigation can do…."
F36D23/1	"I don't know how you farm dryland; we couldn't farm here dry."
F46D23/1	"My sharemilker is not very good at turning the tap off…we've gone to moisture monitoring…you can have the technology…but he keeps watering…."

Examples of how participants describe irrigation are included in Figure 26 above. They illustrate the different approaches of matching land use to natural capital and using 'end-of-pipe' technology in farming. Irrespective of whether their farms are partly or fully irrigated, drystock and arable farmers all describe irrigation as a tool to enhance farm production and income through improving consistency in plant growth and crop yield, enabling a more diverse range of crop options and reducing the risk of crop failure. However, their farming systems can and have operated as dryland systems; they are not dependent on irrigation to farm place. Dairy farming in Canterbury is dependent on irrigation but the Canterbury-born dairy participants describe the measures they have taken to reduce the impact of irrigation restrictions in dry summers on their farm systems. F11, F19 and F31 limit the number of cows they farm to what they think they can feed in a dry summer .F18, F37 and F46 are all arable farmers who have invested in dairy farms as well. They bought their dairy farms in coastal areas with higher rainfall and deeper soils that require less irrigation, F18 bought his dairy farm on the West Coast.

The North Island-born dairy participants tell of coming to Canterbury because of irrigation which they perceive as providing more consistent conditions for grass growth (F14, F23, F24, F32, F35, F36 & F46). F23 bought a traditional Canterbury dairy farm on heavier soils, but the other North Island-born dairy participants have purchased and converted sheep farms on lighter soils with irrigation. These participants were shocked at the severity of the dry conditions in the 2014-16 drought and their response was to try and find additional irrigation water. F32 sunk six, progressively deeper bores before buying a water permit from a neighbour, and F14 sunk a bore to supplement water from the irrigation scheme he subscribes to. The response from those who were not affected by irrigation restrictions in the drought was, "thank goodness it wasn't us." In terms of adapting their farming systems, F32 is trialling cocksfoot pastures which are more drought tolerant than ryegrass, but none of the other participants spoke of modifying their farming system to reduce their dependence on irrigation. F14 commented, "it's either water or supplements [supplementary feed]." As aforenoted, Jay (2006, 2008) and Le Heron (2018) argue that the dairy industry focuses on 'end-of-pipe' technologies that are not likely to affect production to mitigate environmental impacts. Reducing the dependence of a dairy farm on irrigation may require changes which affect production or increase the cost of production such as reducing herd numbers, changing land use, or moving to a farm with heavier soils.

Another explanation for the different environmental management systems between participants may be longevity in place. Berkes (2017) makes a distinction between local environmental knowledge and traditional environmental knowledge which he says relies on learning from other times and places. He refers to the work of Muchagata and Brown (2000 in Berkes 2017, p.244) and Ballard and Huntsinger (2006 in Berkes 2017, p.244) who argue for differences in the extent of environmental knowledge of people working in farming and forestry in South America, depending on their time in place. Both studies suggest those who are longer in place have more complex understandings of ecological processes and adaptation of their farming practices to suit. Similarly, I argue the narratives of the Canterbury-born participants reflect experiential knowledge about Canterbury they have acquired from their own experiences and knowledge handed down from previous generations. It is a different way of knowing born from longevity in place. To that end, I argue for some parallels between the narratives of the North Island-born dairy participants adjusting to farming in Canterbury and Holland's (2013) description of nineteenth century farmers settling in Southland, New Zealand.

Holland (2013) suggests settlers in Southland were given inaccurate advice about climate before emigrating, and he argues the settlers may have benefited from seeking advice from local Māori in their early years of farming. He accepts that initially contact may have proven difficult as there were few Māori in Southland and most settlers did not speak Te Reo, but he argues the settlers did not consult local Māori on weather and environmental conditions because they viewed Western science as a more authoritative information source than Māori TEK (Ibid, p.18). The North Island-born participants all said they had no knowledge of the severity of Canterbury droughts prior to 2014-16, and how that may impact their irrigation. Rather, they said they followed the advice of other farmers and agri-scientists in the dairy industry about the opportunity to dairy farm using irrigation in Canterbury.

Holland (2013) argues for evidence that over time settler farmers in Southland modified their farming practices as their local environmental knowledge increased, including the use of more diverse species in pasture mixes, adopting cattle and sheep breeds more suited to local climatic conditions, and trialling new pastures and practices before adopting them on farm. In my research, only F32 spoke about trialling the use of a traditional Canterbury pasture species (cocksfoot) in dairy farming, though both F23 and F24 said they found the advice from Lincoln University's Dairy Farming Unit more appropriate for dairy farming in Canterbury conditions than that of Dairy NZ. It will be interesting to observe if other adaptations to dairy farming in Canterbury occur over time. Figures 27a to 27c illustrate different pastoral farming systems in Canterbury: traditional dryland sheep and cattle grazing on permanent pasture with well sheltered paddocks, and 'new dairy' with dairy cows winter grazing on small strips of fodder crop, and green grass in February as land is irrigated with large-scale centre pivots.

Figure 27a: Sheep grazing, Horsley Downs Canterbury (photo: author)

Figure 27b: Dairy cows strip grazing a rape crop, Hawarden, Canterbury (photo: author)

Figure 27c: A large centre pivot irrigator maintaining green pasture on light soils at Balmoral, near Culverden in February 2020 (photo: author)

Farming with Wild Ecosystems

Figure 28: Using Wild Ecosystems in Farming

F02H23	"Wethers were brought down in May and left on low country until it snowed. Once the permanent snow line was established they were put back out and the snow line stops them going too high."
F02H23	"Wetlands are a good place to put cattle in winter time, always plenty of feed in there and snow clears reasonably quickly. They are a good source of stockwater in the summer…."
F07L42	"We have quite a lot of bush and scrubland on the place and areas of tussock because Dad considered tussock and matagouri provide shelter for lambs."
F07L42	"I remember Dad telling me he went into the bush and he could see the erosion there. The bush was doing its thing and he made up his mind that there wasn't any point in clearing it, even though you were paid to do it."
F09A23	"When we sow our crops we create a green bridge between new seasons crops and old seasons crops that gets covered in fungicide and aphids [as predators]."
F16L42	"With all our development we have kept the balance between tussock and developed land…behind every tussock there's a wee shadow patch where there is no snow and under every matagouri bush there is always grass growing…."
F21L23	"It's not only wetlands and bees; it's about looking after pasture and seeing if there is a lot of clover in there. I've got good healthy pasture…worms are important."
F29L43	"I am a firm believer that if clover is there doing it naturally why would you put synthetic stuff on out of a bag, apart from the nutrient implications…."
F34L23	"You can't spray everything…I'd rather burn. If you burn you are probably not going back to that block for 10-15 years…If they want to keep the tussock...they need a fire through it [otherwise it] gets swamped with woody plants...then your bottom cover is gone and you have trouble with flooding and slips."
F30M23	"The [bush] areas have pretty dark steep faces so have limited agricultural value and they are useful in gullies; they are tying the ground together…and purely from a production point of view it would be uneconomic to clear… It just makes sense [to leave the bush]."
F39A43	"If you leave the grass at the sides of your paddocks...the lizards can live in there... and keeping water races going because it gives water to the bees, cock-a-bullies and eels."
F47L43	"Every tussock is like another shelter belt; it has a microclimate around it. I've seen people ploughing out the last tussock …but you can grow the grass between the tussocks if you manage them right."

The second example of different approaches to environmental management between participants is in the management of wild ecosystems on farm. In Chapter Four I argued that arable and drystock participants describe the family farm as nature and wild ecosystems as an integral part of production. Figure 28 (p.105) lists examples of how participants describe their use of wild ecosystems in farming place. Hill and high country participants hold detailed and complex knowledge of wild ecosystems on their farms and how to farm with them in ways which maintain their ecological integrity and allow regeneration; knowledge which is handed down from previous generations. F16 told of learning not to mow matagouri as it regrows as a mat rather than an upright plant, and F34 told of learning how to burn tussocks from his father in a way that removes the dead fronds but protects the heart of the plant. He said ecologists are interested in his tussocks because they grow vigorously and are not susceptible to New Zealand Tussock Grassland moth species (White, 2002) but he believes ecologists do not accept that periodic burning achieves these results. This argument is reminiscent of Berkes (2018) observation that there are significant differences between Western scientists and indigenous farmers about the value of fire in managing landscapes.

Farming with wild ecosystems includes a duty to protect those ecosystems for both their intrinsic value and their utility in the farming system. In Chapter Four I noted that all hill and high country participants and some down country participants have conservation sites and areas on the family farm that have been maintained for generations. F30 suggests many of those sites remain because the land has marginal value for farming and is easier to maintain as a wild ecosystem. Initially I felt disappointed by F30's statement. I was in Sandercock's (1998) 'modernist planning trap', thinking that if participants really care about environmental values they would retain these wild ecosystems irrespective of whether the land is 'marginal' for farming. I was adopting a Western conservation epistemology assuming that wild ecosystems are best 'protected' if they are set aside from any use (Howitt, 2001; Berkes, 2012). Yet the number of wild ecosystems and conservation sites described by the participants in this research was sufficient for me to label their farming systems as an 'underground conservation network' in Chapter Four, which challenges the notion that wild ecosystems have to be formally set aside as 'protected lands' to be conserved. This issue is discussed further in the case study on managing conservation sites in Chapter Seven.

Extensive dryland pastoral systems do not align easily with either Western agri-science or planning paradigms. Morris et al (1995), Campbell et al (2009) and Pawson (2018) claim the focus of agri-science both historically and contemporaneously is on increasing production per hectare. To that end, F16, F41 and F53 suggest extensive dryland pastoral grazing is undervalued by agri-scientists because it does not maximise the productive potential of the land. They argue extensive dryland pastoralism does not align with prevailing views of conservation in the environmental planning processes either, because wild ecosystems are integrated into farming systems rather than set aside as 'protected' land. F07, F41, F42 and F53 argue that in hill and high country areas, separating 'protection land' from 'production land' through environmental planning processes under the RMA (and tenure review under the Crown Pastoral Lease Act 1998) results in an overall loss of biodiversity. 'Production land' has to be farmed more intensively to generate sufficient income to remain in place, and the 'protected lands', once removed from grazing, become overrun with exotic plant pests such as wilding pines. Berkes (2017, p.48) observes that

many areas of the world which contain high levels of biodiversity are also areas where indigenous people are found using the land for grazing and rotational agriculture.

In Chapter Four I suggested that claiming non-indigenous intergenerational family farmers farm in a respectful and reciprocal relationship with nature seems inconsistent with historic farming practices in Canterbury which involved clearing indigenous vegetation and draining wetlands. Also, it appears inconsistent with contemporary environmental impacts of farming such as on-going indigenous biodiversity loss and degradation on some freshwater bodies; impacts that cannot be explained in an historical context. Perhaps, as Wadley and Palmer (2007) argue, my research has revealed a difference between what is told in the narratives and what is done on farm, though in this research I have been shown what is done on farm as well. As noted in Chapter Four, the participants distinguish between their farming systems and 'farm developers' which they identify as the farmers more likely to be clearing tussock lands and draining wetlands to create more pasture, today. Secondly, as discussed in Chapter Four, participants suggest that farmers' values towards wild ecosystems have changed over time. F30 told of places on the family farm which his parents cleared with a Land Development Loan in the 1970s and which he is replanting to manage soil erosion; and F38 said his own views about the value of wild ecosystems on farm have changed:

> " When we came here we had thousands of acres of native and all I could see was potential, so we ripped into it and we burned and cultivated...and as I've got on I've said, 'wow we might just leave that'… I look at it through a different lens than I did…."

Pawson (2018, p.183) notes a similar change in how regenerating bush is valued and managed by farmers on Banks Peninsula.

My position is not to argue that non-indigenous intergenerational family farming has no significant impacts on the environment; rather, that those impacts are recognised, participants adapt their farming systems to address them, and pass that knowledge on to the next generation. In this sense, the farming culture of some participants has parallels with TEK. It is recognising the environmental impacts of farming practices and adapting those practices in circumstances where the environmental impacts are undermining the natural ecosystems on which farming depends (Johnson 1992, Alcorn, 1994, Swiderska 2013, Scoones & Thompson 1994a; Berkes 2012; Whyte 2013; Dahl 2015). Wynn and Cant (2001) argue for evidence from the early days of colonial farming in Canterbury, that some farmers were concerned about the long-term impacts of the 1860s wheat boom on soil fertility. They note that speakers at the opening of Lincoln Agricultural College in the 1880s stressed the need to arrest reckless exploitation of land and they were well-supported by "the better farmers of the Plains" (Ibid, p.79). F30 goes so far as to suggest that non-indigenous intergenerational family farmers in Canterbury are sufficiently motivated and adaptive that they do not need regulation to address environmental issues, just good information. Given the non-indigenous intergenerational family farmers farming in Canterbury today are 'farm survivors,' presumably they are the farmers who have adapted their farming practices over time. In that context, F30s suggestion may not be as 'rose-tinted' as first appears.

5.4 Socio-cultural values in Farming

The quote at the start of this chapter describes farming as a passion, a way of life and all the narratives describe farming as including socio-cultural factors: farming as a vocation; farming as familial interaction; and farming as being part of a community. Those three concepts are depicted as part of farming in Figure 22 (p.95) and discussed in this section. All participants describe farming as a vocation or a passion, a way of life. No participant referred to farming as 'a job'. Inch (2008, p.81) said, "The day I start seeing farming as a job is the day I shouldn't be doing it." Every participant described their love for farming from an early age and there was healthy debate among the participants about the age at which you can 'spot' the next farmer in the family; somewhere between 2 and 10 years of age. Participants in research undertaken by Morris et al (1997) and Dominy (2001) also described farming as a vocation and McLauchlan (1981, p.9) captures this notion in his description: "…Every day of his (sic) life had been a happier day than if he had spent it in any other occupation. How could that be expressed in money?" Nearly 40 years later F28 echoes this sentiment in his comment, "It isn't paid at all well but I enjoy it…satisfaction that is a big part of farming."

Figure 29: Descriptions of Farming as Vocation and Identity

F02L33	"I'm not into cropping, sheep and beef is in the blood."
F10M43	"We're into vegetable seed…a lot of people said why aren't you dairying but we don't want to go dairying…you've got to be keen because when times get tough you've got to be enthusiastic."
F25M23	"My father started [deer farming] when I was only big enough to look through the keyhole…so I was probably 5 or 6…I just loved it. And it always amazes me when you are shifting a mob of deer…I've got all day and I can happily wait for them; if it is a mob of sheep and they won't go through [a gate] in the first two minutes I get cranky but deer I just watch them, fascinated."
F30M23	"I love fine wool and I'll never get that out of my system."
F46D23/1	"I love cows…you know there is so much animosity to dairy farmers…but even when I was young I'd try and keep my cows in good order…and I like milking cows, breeding cows, having a love affair with cows as you do…that makes the difference between an average farmer and a very, very good farmer."
F49A23	"I like being a cropping farmer…sheep are a pain; maggot-attractors…dairy farming just never appealed to me; it is just not where I came from."
Forrester	"Jim and Frank were running 3000 plus Corriedale ewes and Jim had a hobby - 80-odd Hereford cattle. Typical of a farmer to take up farming as a hobby!" (2015, p.176)

The participants do not describe wanting to be 'a farmer' per se. Rather they describe a passion for a particular form of farming and that other forms of farming hold little interest. The quotes in Figure 29 above illustrate this point. Morris et al (1997) and Burton (2004) studying farmer reluctance to change land use in the MacKenzie Basin, South Canterbury and in the United Kingdom respectively, both observed that farmers identify themselves with the type of farming they do. They do not want to be foresters or tourist operators. F10, F31, F46, F49, and F53 said you need to be passionate about what you farm to keep farming when times are tough. As well as a love for a specific form of farming, the participants also describe their love of the farming lifestyle: hard work and long hours, but working outdoors in nature, having independence and variability in your work. F47 suggests one of the most galling aspects of increased regulation of farming is that it erodes that sense of independence. Also, I would add that it masks contextuality and variability within farming by assuming a single conceptual understanding of farming and seeking to manage what are activity and place-specific issues using generic regulations. When considered in this context, it becomes clear why there is conflict at the interface of farming and the environmental planning process and why that conflict varies between farmers and issues.

Because farming is a vocation, the participants want to be recognised as good farmers. Pawson (2018) observes that the desire to do a good job has always motivated most farmers. However 'success' is not measured by maximising farm profitability or farm production. Rather 'success' is measured by remaining in place. To that end, the participants differentiate between being a 'successful' farmer and being a 'good' farmer. Remaining in place is dependent on variables that are beyond a farmer's control, such as weather, commodity prices, and the decisions of other family members, so a farmer does not have to be 'successful' to be a 'good' farmer. Rather, the mark of a 'good' farmer is based on the quality of the products s/he produces and how they are produced. For example, F24 aims to have his cows produce their own body weight in milk solids each year, F02 aims for a AAA line of wool every year, and F28's goal is to produce 100 000kg of lamb per annum. However these measures are not of farm profitability but farmer competence. To achieve those outputs, both livestock and the land that supports them have to be well-nurtured. Dominy (2001, p.189) observes,

> "the fleece precisely reflects the condition of a year's nourishment and of farming practice. His (sic) capacity to 'get it right' depends upon numerous decisions…"

When researching dairy farmers in the Waikato, Jay's (2007, p.270) claims that productivity among some farmers was being taken to a level which she suggests, "…inspires a degree of emotional commitment that is beyond the calculus of profit and economic reasoning". Burton (2004) also observed a strong focus on productivism rather than profitability among family farmers in the United kingdom, which he suggests may be influenced by the role of farm subsidies. However, he also argued for the role of production as part of the 'ethos' of being a good farmer. If milk production is understood as a measure of the vocational skills of a dairy farmer, and the motivation of the farmer is to excel at her/his vocation, then a focus on production 'that is beyond the calculus of profit and economic reasoning' makes sense.

As well as vocation, farming is the means by which non-indigenous intergenerational family farmers interact as family in place. The inseparable nature of family, home and farm described in Chapter Four means that families work together on the family farm. The narratives describe protocols for how family members interact with one another, who makes decisions, and who speaks for place. The participants tell of earning the 'right' to farm place through a combination of age and demonstrated skills and responsibilities. Every child starts with responsibility for feeding orphaned lambs or bobby calves and progresses through rites of passage until they are 'handed the cheque book' on farm succession. Menzies (1970, p.169) said, "As children we learned to milk as soon as we could grasp a teat (with our fingers I mean)." F02 told of the day he was first allowed to join a three-day muster, "You put on your boots, had your stick and your dogs, and you were a real man." F28 recalled how thrilled he was the day his father told him he could check the shedding up for shearing:

> "It was always the most experienced person who walked through the shed…to make sure the [sheep] numbers weren't too tight and to put the pins in the lift gates. When I was about 12, Dad said, 'oh you walk back through the shed and check everything is alright.' Previously to that, he had always done it."

The term 'farming in your own right' refers to the point at which a person is handed financial responsibility for place and therefore responsibility for ensuring the family remains in place. With that responsibility

comes the right to speak for and of place and those protocols are apparent in how the narratives are told. Every member of the family who was home partook in the oral narratives, irrespective of whether they are involved in the daily farming of place. In many cases the oral narratives were told by two generations at the kitchen table, in one case, three. Where adult children are farming, but their parents retain financial control, the adult children let their parents speak first. The children have their own views about how to farm place and what they may do differently, but they quickly acknowledged that their parents have been successful (the family is still there) while the children have yet to achieve that goal. Similarly, where parents have 'handed over the cheque book' to their children they acknowledge that in their narratives with statements such as, "of course William is running it now" (F51) or "Bruce might want to do it differently" (F03).

Whether they are farming the land, raising a family, or working off-farm, a women's contribution is valued on the family farm. Just as the participants do not compartmentalise the farm into 'production land', 'protected land' and 'home', they do not distinguish between those who work on-farm, off-farm, or at home. Everyone contributes to remaining in place and the narratives tell of fluidity in roles between farming, domestic tasks and off-farm work, especially for women and grandparents. As noted in Chapter Three, Dominy (2001) was told by her participants that they work as a family unit. The female participants who are farming tell of being readily accepted in the role of 'farmer' by their family and by other farmers: a 'good cocky' is respected irrespective of gender. Menzies (1970, p.127) wrote of his wife, 'Boodles is potentially the better farmer…she is gifted with an ability and judgement of stock and pastures not given to many men." At face value, it seems paradoxical that women as farmers are widely accepted by the participants yet the narratives around farm succession, at least until the current generation, tell of unequal family inheritance in favour of sons? Further research is needed to explore and explain this paradox, but it may reflect the primary objective of remaining in place. Farm succession is not about enabling children to go farming, it is about ensuring the family remain in place and patriarchal farm succession enables that outcome. This insight is significant in understanding how environmental planning processes can impact on non-indigenous intergenerational family farmers: farming issues become family issues.

Finally, farming is belonging to and interacting in a local community. Forrester (2015) suggests the physical and mental isolation of farming makes community important, and there are protocols around community interaction. One such protocol is to support your neighbours. Keer and Keer (2000, p.170) wrote that their father's advice was, "…look after your neighbours, you never know when you might need them" and the narratives describe community as a network to share information, resources and support. Salas (1994, p.61) in a study of Andean farmers observed,

> "agricultural activities…are not mere technical procedures…work is organised according to the principle of reciprocity…. This working together, mutual help, reciprocity are inseparable notions….."

Taking on roles in the wider community is another important part of the participants' culture, though most said getting involved in activities off-farm is much harder than for previous generations when there were more farm workers. F12 said, "it has always been the same people who do everything in a local community, but now there are fewer of them and more to do" and Stapleton-Smith (1990, p.186) wrote, "farmers tend to be the local 'everything'." Keer and Keer (2000, p.127) wrote, "where people are few and

the tasks many, you've got to do your community bit". Smith et al (2007) found in their research with North Island hill country farmers, that participants identified 'healthy communities' as important to quality of life and the sustainability of farming, and some participants in my research were critical of dairy farmers not wanting to be part of the local community (F18, F49). However, some of the dairy participants told of finding it hard to integrate into farming communities in Canterbury. F35 said his wife found it hard to make friends and F05 said their grandchildren were bullied at school for being dairy farmers. F14 suggests there is a social hierarchy in Canterbury, "…the intergenerational sheep farmers are at the top but you just have to get out there and join in." Eldred-Grigg (1980), Hatch (1992), Morris et al (1995) and Stock and Peoples (2012) all suggest there is evidence of a social hierarchy in farming in Canterbury. Whether a long-held. socio-cultural predisposition towards sheep farming in Canterbury colours the participants' views about dairy farming is another thesis. The pertinent point for this research is the role of socio-cultural factors in farming, reinforcing my argument for non-indigenous intergenerational family farming as cultural knowledge.

Another protocol of the participants' farming culture is not to publicly criticize other farmers or how they farm. This protocol is consistent with three key characteristics of family farming culture discussed in Chapter Four and this chapter. Firstly, that farming is place-specific and that the farmer in place is the expert in farming place; if not, s/he will learn or nature will force her/him out: there is no need to comment. Secondly, even very good farmers can 'lose the farm' in adverse weather events or an economic downturn. Therefore a prudent farmer focuses on their own farming, not others. Thirdly, as Keer and Keer (2000) noted above, farmers rely on each other. As F49 said, "confronting someone and saying we do not think you are doing this well, that's pretty abrupt and rude." One of the criticisms participants made of Fernyhough's (2007) narrative of Castle Hill, was that she criticized in print, the condition of the farm when she took it over, and the work of her farm managers and advisors. In Chapter One and in Section 5.1 above, I have commented on the reluctance of farmers to publicly criticise dairy farming in Canterbury even when dairy farming is perceived to be adversely affecting other farmers, which suggests this protocol is very strong. It raises a question, at what point is that sanction is broken?

5.5 Conclusions and Reflections

How participants farm their land varies between narratives, but across all narratives there are shared understandings of farming as an activity. That understanding is not one of farming as an 'economic *versus* environment' proposition but farming as 'economics ***and*** environment ***and*** socio-cultural factors, ***in place***.' Farming is the production of quality food or fibre which generates income to remain in place; but it is also in-situ environmental management, a vocation, and familial and community interaction. The activity of farming described in the narratives differs from the farming epistemologies assumed in agri-science and the environmental planning process in five ways. Firstly, farming is cultural knowledge of place, it is an in-situ environmental management system that balances a range of economic, environmental and socio-cultural factors. Farming is not a generic activity that occurs on any medium of land. Secondly, the purpose of farming is to remain in place long-term, not to maximise income or production short-term. Thirdly, farming is a reciprocal relationship with nature which includes duties to address environmental impacts and to protect the values of wild ecosystems. That relationship is not environmentally benign, but it recognises and responds to environmental impacts to sustain itself long-

term. Fourthly, the Canterbury-born participants demonstrate detailed and complex knowledge of their environment in place and farming to that environment. Finally, farming is a means of familial and communal interaction, and is bound by ethics and obligations.

The Canterbury-born participants distinguish between Canterbury-born dairy farmers and 'other' dairy farmers (including North Island-born family farmers and 'corporate' farmers). They hold strong, negative perceptions of dairy farming in Canterbury as it is undertaken by 'other' dairy farmers, though their own socio-cultural protocols mean they do not express these views publicly. KIVU (2015, p.6) argues, "indigenous peoples feel that they belong to the land so they may not easily accept changing it, or their relationship to it in any radical way" and Le Heron (2018) suggests that dairy farming has become less acceptable publicly as it has pushed on to land not usually noted as suitable for dairy. These factors may all contribute to the perceptions of dairy farming described by the participants, though alone it cannot explain why Canterbury-born dairy farmers are perceived differently. Eldred-Grigg's (1980), Hatch's (1992) and Stock and People's (2012) suggestions of the existence of a farming 'hierarchy' in Canterbury may provide an explanation. The participants' criticisms relate to how dairy farmers farm their land – with cows standing in mud, and how they do business with other farmers, as the reasons for their objections. Dominy quotes Franklin (1978 in Dominy 2001, p.183) that, "the farming community is a social body - diverse and not always united - which has its own ethics and beliefs and clearly held objectives that it seeks to defend and advance." In that context, I argue the 'North Island' way of dairy farming is perceived by many of the Canterbury-born participants as one that challenges their ethics, beliefs and objectives about farming in Canterbury.

The narratives describe two different systems of farming as environmental management in Canterbury, one more commonly used by the dairy participants, the other more commonly used by arable and drystock participants. One system assumes different forms of farming can occur on any land or soil type using inputs such as irrigation and fertiliser to create a production system and agri-science technology to minimise environmental impacts. In this system land is the medium on which to practice a type of farming and 'production land' is separated from wild ecosystems, the latter fenced off. This is the farming system described by the dairy participants. Secondly, there is a system of choosing land uses suited to local environmental conditions, or 'matching land use and natural capital,' which reduces the need for inputs to support the production system and reduces environmental impacts. In this system, farming is place-specific and wild ecosystems are managed as an integral part of the farming system. This system is more often described by arable and drystock participants.

Relying on Howitt (2001), Bromley (2004), Berkes (2017) and Le Heron (2018), I have argued that the dairy farming environmental management system is more closely aligned with Western conservation strategies and the environmental planning process than those of drystock and arable farmers. The dairy environmental management system is generic and 'scientific', each environmental effect is managed separately using 'end of pipe' technology developed by agri-scientists and rolled out to farmers in Dairy NZ extension programmes. This approach fits well with the Rational-comprehensive Planning Model and neo-liberalist ideologies that underpin the contemporary environmental planning process in New Zealand discussed in Chapters One and Two. The environmental management systems used by arable and

drystock participants are contextual, experiential and rely on the knowledge and expertise of the farmer in place. In short, it is applied environmental management, not readily replicable from farm to farm or easily measured or assessed by planners who do not have in-depth farming knowledge. A colleague at Environment Canterbury asked me how the council could get arable and drystock farmers to focus on environmental management as dairy farmers have (Aldridge, 2016, pers. comm)? I wondered why he had the impression arable and drystock farmers do not have environmental management systems as advanced as dairy farmers? It may be that my colleague and other environmental planners do not recognise the environmental management systems of arable and drystock farmers because they are not as readily transferable into the contemporary environmental planning process as the environmental management systems used on dairy farms?

CHAPTER SIX Farmer Knowledge & Decision-making

"*Modern farming is a science: make use of the laboratory"* (LS Spackman, Agrichemist & Analyst, 1936, p.76)

"I have been brought up on the land and brought up here…I know this place really well. I know from my father's experience and I know from my own experience…A bit of Lincoln [University] saying look can you do better…and a bit of upbringing." (F12L23)

6.1 Introduction

This chapter discusses the final of the three topics identified in Figure 11 (p.70) being farming knowledge and decision-making. The quotes above encapsulate two perspectives of farmer knowledge: that of agri-chemist L.S. Spackman urging farmers to 'use science' in his advertisement in the 1936 edition of 'Farmcraft'; and that of F12 describing his farming knowledge as a combination of handed down knowledge, his own observations and experience, and agri-science. How participants acquire farming knowledge and how they make decisions about farming is pertinent to the research questions in two ways. Firstly, how people acquire knowledge and what constitutes valid knowledge are two of the 'sign-posts' for different ways of knowing depicted in Figure 5 (p.30). Secondly, understanding how farmers make decisions is imperative to the success of the environmental planning process in addressing environmental issues associated with farming. As Hall (1992) suggests, planners or policy-makers ought to understand the systems they are planning for, and as Friedmann (1973 in Hillier & Huxley, 2008, p.26) observed:

> "To change the reasons why people act the way they do and produce the results they do, one must respect the processes by which they learn."

Participants know place through farming the family farm and know farming through farming the family farm. Therefore farming knowledge is contextual and experiential. However, there are outside sources of information which contribute to the participants' farming knowledge, including other farmers and agri-science. This chapter traverses three topics: Section 6.2 describes the characteristics of the participants' farming knowledge; Section 6.3 discusses sources of farming knowledge; and Section 6.4 analyses how participants apply that knowledge to make decisions on farm. Before addressing these three topics, two terms used in this chapter need defining: 'diachronic knowledge' and 'synchronic knowledge'.

The term diachrony comes from the Greek meaning 'through time' and the term synchrony from the Greek meaning 'together and time'. The two concepts were theorised as forms of complementary knowledges by de Saussure in his post humous publication Course in General Linguistics in 1916 (Allen, 2013; Ramat et al, 2013). Synchronic linguistics is the study of the function of language and diachronic linguistics is the study of the evolution of language over time (Allen, 2013). Synchronic and diachronic forms of knowledge are recognised knowledge sources in several social science disciplines including human geography, sociology, anthropology and philosophy (Ramat et al, 2013). Diachronic knowledge is recognised as knowledge acquired from working and living with nature in place, over time, and which is handed down through generations. Therefore, diachronic knowledge its forms a significant part of TEK

systems. Synchronic knowledge refers to knowledge which is acquired from the study of function at one point in time and is characteristic of experiential research associated with Western science.

As noted in Chapter Two, some researchers have written about farmer decision-making but much of that sits within the context of agri-science literature underpinned by a theme of 'improving' farmer decision-making and/or performance, for example: Allen et al (1998), McCowan et al (2012), Long (2013), Nuthall and Old (2017, 2018), and Brown et al (2016, 2019). That literature is underpinned by ontological assumptions about farming as commodity production and that 'expert' knowledge to improve farm production and manage environmental effects is held by agri-scientists and environmental advisors. By contrast, this research is exploring the participants' farming knowledge within the context of an understanding of farming as cultural knowledge of people-in-place. It more closely aligns with the ethnographic studies of small farming communities undertaken by researchers such as Hatch (1992), Morris et al (1995, 1997), Dominy (2001), Duncan (2016) and others identified in Chapter Two, but with a larger and more diverse farming community. As such, the views of the participants in this research may not be representative of all farmers or all non-indigenous intergenerational family farmers in Canterbury.

6.2 Characteristics of Farming Knowledge

The process of interpreting and analysing how the participants relate to the family farm in Chapter Four and how they understand farming as an activity in Chapter Five, has involved describing and analysing the participants' knowledge of farming. Key characteristics of that knowledge have been identifed in those chapters and are discussed in this section. The first characteristic is that the participants' farming knowledge is place-specific: every farm is different; every farmer is different; and the participants are careful not to generalise their farming knowledge. When describing their farming practices, participants make comments such as, "I can only speak about my experience…" (F03) or, "…of course that may be different on someone else's place." (F53). Marsden (1994) observed the place-based nature of knowledge among indigenous farming communities. He quotes Illich (1982, in Marsden, 1994, p.54), "Each village does its own dance to the tune of its own regional music". Consequently, the 'expert' in farming place is the person who knows place. McRae (1968, p.109) wrote, "Bill McRae had a real eye for making a road; I think years of walking and riding on the blocks gave him this built in sixth sense of where to go." Fifty years later, F42 said:

> "it cracks me up how everybody else thinks they can tell me how to farm this place. No one knows this place better than me; I walk it every day… and as well as my own knowledge, I have that of my father and my grandfather handed down to me."

Because farming knowledge is place-specific, the participants do not farm to a set of universal rules. Rather, as described in Chapter Five, each participant has a farming 'philosophy' or set of principles around balancing economic, environmental and socio-cultural factors to achieve the goals of producing quality products and remaining in place. The actions which achieve those outcomes will vary with time, place and circumstance. For example, arable farmers F09, F43, F45, F48 and F49 all talked about stubble burning as an appropriate management tool in some circumstances and not others, and every arable

participant had a different way(s) of cultivating or drilling their land depending on their soil types, the crops they were sowing, and local environmental conditions.

The participants' farming knowledge is comprehensive and complex, using a blend of diachronic and synchronic sources applied in a place-specific context. Alcon, (1995, p.6) observed that farming knowledge among indigenous communities is fine-tuned to local conditions by farmers experimenting over generations, and the narratives reveal similar patterns of detailed, place-specific knowledge among the participants. In Chapter Four, I described how the arable and drystock participants described soils and weather patterns on place. Similarly, the arable and drystock participants told detailed stories about fertiliser and irrigation use. The fertiliser regimes varied from conventional chemical applications of nitrogen or 'Super Phosphate' (phosphorous and sulphur) through to biodynamic farming, but each participant had a detailed story about the biological and chemical properties of their soils and why they use the fertiliser regime they do. No participant said they applied fertiliser in accordance with the traditional practices of their parents or grandparents, though some noted, with irony, that after years of poor performance with chemical fertilisers, they have changed to applying lime as their grandparents used to do (F02, F06, F21, F30). All participants soil test, but all said that soil testing alone can be 'hit and miss'. so corroborating information is used to determine fertiliser requirements for example: observations of plant growth; historic information about mineral deficiencies on farm; and knowledge of the minerals likely to be depleted depending on the crop and grazing rotations employed.

The arable and drystock participants told detailed stories about creating irrigation systems tailored to suit their soils, climate and land use. For example, F45 crops on heavier soils so he can use a system which applies more water less often, whereas F49 has lighter soils with a clay pan underneath so he has to irrigate little and often, taking care not to over-water because the clay pan impedes soil drainage. Consequently F45 uses a spray gun to irrigate while F49 uses laterals so he can have more control over irrigation application rates. Far fewer arable participants use centre pivot irrigators than the dairy participants, because the arable participants all said they wanted to retain tall shelter belts. F11, F17, F33, F48 and F49 questioned whether centre pivot irrigators are more efficient than other irrigation systems once water loss to evapotranspiration is factored in (from the removal of shelter belts). Also, arable participants are critical of the use of soil moisture probes as a guide to irrigation application rates because the probes only measure soil moisture. The arable participants use soil moisture budgets which they calculate considering soil moisture, evapotranspiration rates, and plant demand for water, which varies with both plant variety and stage in the growth cycle. Both F48 and F49 told of their frustration at being required by their irrigation water supply company to install soil moisture probes on farm (to comply with environmental regulations) even though they use soil moisture budgets which are much more accurate.

The North Island-born dairy participants did not describe their fertiliser or irrigation use in the same detail as the arable participants. When I asked, the reply was that they apply fertiliser and water in accordance with 'industry guidelines'. The Canterbury-born participants who have converted to dairy farming (F11, F19 and F31) describe their fertiliser and irrigation use in more detail. This difference in the depth and detail of knowledge about soils, weather, fertiliser and irrigation in the narratives may reflect that the North

Island-born dairy participants have not had generations in Canterbury to 'fine-tune' their systems to local conditions; and/or it may reflect a difference in farming backgrounds. The educational and training backgrounds of the participants is discussed in Section 6.3.

In Chapter Four I noted that the narratives tend to focus on different aspects of farming depending on the type of farming the participant does, and the participants perceive that some forms of farming require superior knowledge and skillsets to others. Arable farming, in particular, is understood to be very technical because of the degree of information and co-ordination required to match crop rotations with soil types, fertiliser requirements, agrichemical combinations and isolation distances to avoid cross-pollination; all while farming to supply contracts which change every year. As noted in Chapter Four, the narratives also tell of dryland farming as an 'art' because success is strongly linked to being able to read and respond to weather patterns. Also, a good livestock farmer has a 'stockman's eye' – the ability to observes and judge both stock performance and the suitability of 'country' to graze livestock (Newton, 1973). Dairy farming, by comparison, is viewed by some participants as requiring fewer skillsets. F43, an arable farmer, said,

> "There is no set recipe for arable…every farm is different; each paddock is different…it is challenging and that's why I started doing it…it's complex…whereas in dairying I think the recipe has been developed and you just go out and do it."

F45 who is an arable farmer and owns a dairy farm as well refers to the latter as, "…farming by remote control" and F14 who married into a dairy farming family said he was able to learn a lot of dairy farming form 'a textbook.' F11 converted from arable to dairy farming when they wanted to retire because they thought it would be easier for a lessee to farm dairy than arable: "Dairy farming is farming to numbers, whereas arable farming you need to know the soils and microclimates." F46, a North Island-born intergenerational dairy farmer, disputes that dairy farming requires less skillsets than other forms of farming, though he has not done other forms of farming. However he, and the other dairy participants, acknowledge that it is much easier to see the impacts of decision-making with dairy farming because the results are visible in milk production within 24-48 hours. With arable and drystock farming, the farm product is an amalgam of multiple farm decisions over a much longer period of time, so it is harder to establish cause-effect relationships. Morris et al (1995) made a similar observation when comparing uptake of new technology among dairy and sheep and beef farmers in Temuka/Geraldine.

The narratives contain many examples of innovation and experimentation by farmers, suggesting much farming knowledge is hands-on and farmer-led. Cornwall et al (1994) researching patterns of farmer decision-making in Africa, Asia and Latin America, argue that indigenous farmers continually conduct their own trials and partially adopt or adapt technologies to suit their specific circumstances; and innovations spread through farmer networks. Similarly, McLauchlan (1981, p.11) observes many of the problems associated with farming are practical ones and "…they produced many a brilliant 'do-it-yourselfer'." Figure 30 (p.118) includes examples of 'farmer innovation' selected from the many innovations described in the narratives. The examples are reflective of the themes in this research, illustrating that the participants are the experts in farming place and drive their own farming practices and innovation, supported by knowledge acquired from a variety of sources. However the innovations are

largely at the micro-scale, finding new ways to farm within a farming system that is inherently conservative. As will be discussed in Section 6.4 below, macro-scale changes to the farming of place only occur when the participants perceive that the current farming system will not enable them to remain in place.

Figure 30: Examples of Participants' Farming Innovations

Narrative	Example
F10M43	Trying cattle on irrigated Lucerne " it's possible, but it is very complicated."
F11M43	Worked with a local engineering firm to design drills that would direct drill crops that traditionally require a cultivated seed bed, to reduce wind erosion.
F15M23	Growing weaner deer indoors in winter under lights to supply the European Christmas market for venison.
F16L42	Experimenting with various techniques to protect young trees from being ring-barked by hares.
F17A42	Fenced and planted shelter belts in arcs to match the rotation of the centre pivots.
F27L43	Designed a 'triplet creeping gate' which allows lambs to pass through to feed on better pasture but still see the ewes in the next paddock.
F29L43	Uses electrified bungy crossings rather than conventional gates to allow cattle to move between paddocks and laneways without getting caught on gates.
F47L43	Installed laneways on his drystock farm similar to a dairy farm so he can move sheep on his own, without dogs, if necessary.

6.3 Acquisition and Transfer of Farming Knowledge

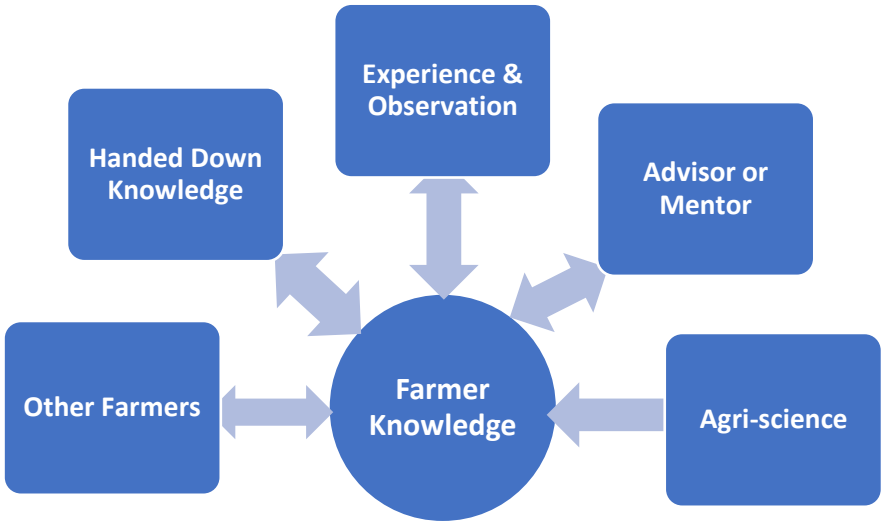
This section identifies the main sources of farming knowledge used by the participants, in particular the extent to which they value diachronic knowledge such as Grandad's diary and synchronic knowledge such as agri-science. As discussed in Chapter One, the environmental planning process in Canterbury has relied on agri-science to identify tools and practices to mitigate effects of farming activities on freshwater and to inform farmers of the need to use those tools and practices. Therefore, the extent to which the participants use agri-science and, in what forms, may be a key determinant in the success of this environmental planning process in achieving desired environmental outcomes. Participants were asked to talk about their educational and farming backgrounds to see if there was any correlation between education and the sources of farming knowledge participants relied on; in particular whether agri-science featured more heavily in the narratives of those who had tertiary degrees.

Some participants left secondary school to work on the family farm, most have tertiary agricultural degrees or diplomas from Lincoln or Massey Universities or Telford Farming Institute, and some have degrees and have had careers in other disciplines before coming 'home' to farm. In addition, all the participants who were born in Canterbury told of having some experience working on an arable farm, either as part of the practical component of formal agricultural qualifications or being sent by their parents to gain arable farming experience. Those participants all mentioned the value of arable farming experience for understanding principles of plant growth, soil fertility and irrigation. The North Island-born participants did not tell of working on arable farms. Even F40, whose family bought an arable farm in mid-Canterbury, had no experience in arable farming prior to moving to Canterbury. I argue the combination of longevity in place and arable farming experience may explain why the narratives of the Canterbury-

born participants focus more on soils, fertiliser use and irrigation practices than the narratives of the North Island-born participants.

McLauchlan (1981) argues dairy farming has always had a closer relationship to innovation and science than other farming sectors, though he does not justify his claim. Morris et al (1995) argue that dairy farming has historically enjoyed a more systematic alignment with agri-science than other farm sectors through the work of the Dairy Board (now Dairy NZ). However**,** all the narratives analysed in this research told of farmers using a combination of diachronic and synchronic knowledge in their farm decision-making, though the longer a farmer has been farming the more they rely on diachronic knowledge. Figure 31 below shows the information sources that contribute to the participants' farming knowledge. The role of each knowledge source in farming place is discussed below.

Figure 31: Sources of Farmer Knowledge



As noted in Chapter Five, all the participants describe farming as a passion or vocation and of having an innate curiosity about land, plants or animals from an early age. Dick (1964, p.10) wrote, "nature was our classroom." Keer and Keer (2000, p.59) said, "Nature teaches you; you do not teach nature. Animals teach you, you learn from them". That diachronic knowledge acquired from being and doing in place is identifed by all participants as the most important source of farming knowledge and is acquired in three ways: knowledge which is handed down from previous generations; knowledge acquired from a farmer's own observations and experiences farming place; and knowledge passed across from other farmers.

Farming knowledge is handed down to participants from previous generations orally through stories and anecdotes, practically in learning skills as they grow up on the family farm, and from written histories such as farm diaries, family histories, articles and reports. All participants said that knowledge handed down from previous generations contributes to their understanding of farming place: it provides detailed knowledge of the geography of place (soils, topography and climate) and how that geography has changed over time. This knowledge is reflected in the descriptions of weather patterns in Figure 20 (p.88)

and several participants spoke about consulting old family farm diaries during the 2014-16 North Canterbury drought (F06, F19, F22, F30) and the 2017 mid Canterbury floods (F45), to see how those events compared historically.

Figure 32: Learning on the Job: Roderick and Johnny Murchison aged 2 and 5 (photo: author)

Figure 32 above shows a scene typical on family farms all over Canterbury (and elsewhere); children learning from an early age by watching cattle or sheep in the yards. Handed-down knowledge is how participants describe acquiring their practical farming skills: technical skills such as learning to drive a tractor or header, to drench sheep or milk cows, 'the skills you do not learn in a textbook' (F12, F30, F38, F53). F12 told of buying a new hill block and watching his father create contours across the hill to manage run-off and soil erosion, "It wasn't anything I had been taught at Lincoln and he told me he learnt that from his grandfather." Clucas (2012, p.5) wrote, "I learned an awful lot from Dad. He treated the sheep like people…." Wright (undated p.12) wrote, "My father was the one who really trained me in my young days and gave me opportunities and encouragement to follow my interests in farming." The experience of being part of an intergenerational family farm also provides life-skills. F15 told of learning the value of farm partnerships from watching his father and uncle farm together and F51 said, "as a family you learn how to let things go, you have to, you are dependent on each other." Finally the participants all said that the values and ethics which make a 'good' farmer are handed down from previous generations such as respect for nature, care of animals, hard work, helping others and keeping your word. While this knowledge passes down generations, older participants also tell of still learning from the ideas and information handed back to them as they watch their children farm place.

Despite this influence of handed-down knowledge, the participants do not 'farm in accordance with Grandad's diary.' Rather, all participants said farming today is very different and they would not survive farming as their grandparents had. However some participants said they know of farmers who do farm in accordance with Grandad's diary. F11 said, "…that doesn't make them poor farmers, but it may mean the farm doesn't reach its full potential." 'Farming in accordance with Grandad's diary' is an enigma: no

participants farm that way because farming today is very different, but they believe there are farmers out there that do. I wondered whether this simply means there are family farmers who farm differently from the participants in this research, or whether the notion of 'farming in accordance with Grandad's diary' is a misperception. Johnson and Madge (2016, p.87) describe an 'Indigenous-Western binary' whereby indigenous knowledge is seen as traditional, unchanging and local and therefore regarded as inferior to the modern, universal and global knowledge of Western science. Similarly, in Chapter Two I cited Bromley's (2004, p.81) argument that a commitment to science and technology to address environmental issues in planning reflects a political ideology which is committed to the notion of advancement through increasing use of science and technology. Could it be that the concept of 'progress' in farming in Canterbury (or elsewhere in New Zealand) is fundamentally challenged by the notion that farmers may achieve a satisfactory farming performance today using practices of the past?

The participants' most important source of farming knowledge is their own observations and experience, which is consistent with. Dominy's (2001, p.159) findings; her participants saying stockmanship is largely 'learning as you go'. Farm diaries are an important tool to record observations and experience, and. Forrester (2015) noted that her father kept a farm diary for 65 years. However, contrary to the persistent myth's about 'Grandad's dairy' discussed in Chapter Two, the purpose of the farm diary is not to guide future generations, but to serve as a written record of current farm practice. F52 described the value of the farm diary to accurately record precisely when activities which have a temporal element such as drenching livestock or sowing crops are done, the number of stock grazing a block and when they were last shifted etc. The farm diary is a good example of a different way of knowing or expressing knowledge. As will be discussed in Chapter Seven, one of the tools being promoted by both agri-science and environmental regulators is the use of Farm Environment Plans to increase farmer's awareness of and response to environmental issues. I have always maintained farmers use Farm Environment Plans in their heads but the environmental planning process does not recognise them because they are not written down. Actually, they are written down; on farm maps, as discussed in Chapter Four and in farm diaries; just not in a form the environmental planning process validates.

All the participants agree a farmer does not have to grow up on a farm to be a 'good' farmer, but a farmer must be 'hands on' working the land, getting to know place because every farm is different. F37 quoted the farming adage, "the best fertiliser is the price of boots" and F38 said that after being in place three years a farm worker starts to become useful. One of the criticisms of the dairy industry raised in the narratives is its transient nature. F35, a dairy farmer, said, "You see it every year in dairy farming, you change the operator and there is always that year of bedding in…it's not just one year, it's learning over time." (McLeod, 1978) wrote about his good fortune when he bought Grasmere Station because the stock manager agreed to stay on, and Newton (1973) wrote of the value of 'twins' of longevity and knowledge in farming. Fernyhough (2007) wrote of being told by her farm advisor to start afresh with a new farm manager when she bought Castle Hill and how over time she learned the value of employing staff who 'knew' Castle Hill. The different perspectives on the value of staff with place-specific farming knowledge told in the stories of Newton (1973), McLeod (1978) and Fernyhough (2007) suggest different ways of knowing farming: farmers who understand farming as primarily place-specific knowledge and therefore the value of retaining staff; and farm advisors who understand farming as generic knowledge that can be applied to any farm.

The single most important source of farming information other than a farmer's own observations and experience, is knowledge gleaned from and shared with other farmers. In the early days of colonial Canterbury, new immigrants were recommended to take up cadetships to learn pastoral farming in the new colony from other farmers (Butler, 1863) and that source of knowledge remains important today. Every oral participant and many written narratives tell of another farmer or farmer(s) who have been particularly influential in how the participant farms place. Hatch (1992), Morris et al (1995, 1997) and Kenny (2011) and Stock and Peoples (2012) all identify local farmers as important agents for the 'cross transfer' of farming knowledge: "Proactive, innovative farmers generally serve as role-models for others in their community" (Kenny, 2011, p.446). This form of knowledge transfer has been observed in TEK literature as well. For example, Winarto (1994, p.153) researching pest management techniques among rice farmers in West Java found that, "…the experts in agriculture are those who have rich experience and good strategies in farming practice." Farmer-to-farmer knowledge is transferred in two ways: farmers within an area who get together to discuss farming; and use of a farm mentor(s) who the participant perceives as being particularly knowledgeable and skilful. Discussions with other farmers may occur in a formal setting such as a local farm discussion group, or they can be informal, occurring at local community gatherings. In her study, Dominy (2001) observed that all the community events she attended seemed to revolve around farm discussions. Arrangements with farm mentors can vary from participants observing farmers they perceive as very skilled, to an active advisory relationship. Gibson (1990) described learning to count sheep from a Scottish shepherd his father employed while Menzies (1970, p.80) described his neighbour as a mentor:

> "I remember starting to plough…when I was 18 and being nearly in tears with frustration and the antics of the plough…and the horses. I was saved from going over the edge by Jim Findlay who came along and helped me strike a good clean furrow and stayed until the horses settled down. Jim came from Scotland, of a family who had been on the land for generations with horses and ploughing in their blood."

Some participants also have trusted 'others' they consult in their decision-making processes. These 'others' may be specialists in any one of many fields from accountancy to agronomy: it is a personal relationship based on the perceived skills and experience of the mentor, not their occupation or qualifications.

Alcon (1995, p.6) argues that indigenous farmers do not describe the details of their farming well,

> "…it is necessary to try and learn to farm as they do. Knowledge is held in customary scripts or ways of farming that farmers learn from their parents and pass on to their children. Often farmers do not know why they follow the script, it is just the 'way it is done.'"

However, the participants in this research articulate clearly why they farm as they do, and it is both a duty and a privilege to share that knowledge with other farmers. However there is etiquette around this knowledge exchange: you must be asked. In Chapter Five, I described the strong cultural more around not criticising other farmers publicly. Similarly, a farmer does not give unsolicited advice. But once solicited, participants share their knowledge readily, including in this research. However, F39 and F43 said that competition for contracts means arable farmers may not always share specific information on how they grow crops. It may be a point of difference between some indigenous farming communities and the participants in this research, that the latter articulate and share their farming

knowledge. Or it may be that, like arable farmers in this research, competition for resources and markets among some indigenous farming communities means they hold their farming knowledge closer (Berkes, 2018). Or it may be that within different farming communities there is etiquette and protocol around how to access farming knowledge, and it was my relationship with the participants that enabled me to access that information.

As well as diachronic knowledge, agri-science and other scientific knowledge contributes to the farming knowledge of the participants. Figure 33 includes quotes from the participants about how they perceive, value and use agri-science. As noted in Chapter Two, agri-science refers to the body of formal, academic knowledge about farm production generated within formal Western scientific paradigms. Participants access agri-science through secondary and tertiary education, field days and extension programmes arranged by grower levy bodies, or directly by reading agri-science research.

Figure 33: Participants' Comments about Agri-science as Farming Knowledge

Narrative	Example
F06L43	"The regulators will be targeting them [agri-scientists] to get technical input into their plans, but these guys have got no idea about the day to day running of a farm."
F09A23	"What they do in all the trials [of seed cultivars] it might be good but when it gets more widely spread [on to farm] it doesn't do any good. It happens with chemical sprays too."
F16L42	"Stockmanship is a very important thing…sometimes they are so busy thinking about the scientific side of it they are not actually looking at the animals."
F24D23/1	"I am supportive of technology, but you've got to have a bit of commons sense with it, and gut feel and observation…you got to put the two together."
F36D23\1	"We don't go out and adopt every new piece of technology out there…we've got to really see the benefits of it…"
F15M23	"I value hugely David Stevenson an agronomist for AgResearch. If you get good facilitators who let the conservation role and the farm practical side comes out as well… that's the value."
F27L43	"The Grassland papers are really good…they have those conferences every year where farmers and scientists talk to each other and farmers can have some influence over the science..."
F21L23	"The thing I learned from Lincoln is that for everything you do there are about six ways to do it, and three are quite good ways…it is up to you to think it out for yourself."
F30M23	"You've got the best of them [agri-scientists] that will be reasonably accurate but in my opinion the best farmers have always led the science…."
F33A23	"I think what you learn hands on farming by miles...At Lincoln [University] you learn the jargon on farming papers, that's the only advantage... Dip Ag was a bit of a joke, it was too easy."
F37M33	"I think we make up our own minds and they just feed in. I do enjoy going to the Lincoln Dairy Farm field days…and early on…Professor Philpott was around…and they were really challenging."
F11M43	"Advisors come and go and the advisor can walk away, you can't walk away from your own farm. You need a bit of science with the TEK to understand why."
F31D23	"I have had so many people sitting around this table saying we are going to do this and do that…and you do it and it is about half as good as what they say it's going to be."
F46D23/1	"With Dairy NZ I'll go to the discussion groups and I love all the information they give...but I take it with a grain of salt….I've had experience where dairy consultants have sent farmers down the wrong pathway."

All participants said they read a variety of farming publications, and access information on particular topics through internet searches or from trusted advisors such as agronomists and vets. Morris et al (1995) and Smith et al (2007)) have observed that farmers have access to an abundance of agri-science information, so much it is hard to manage, yet Smith et al (2007, p.35) identified information gaps in soil

management, water quality and organic agriculture. Participants in my research also said there is an issue with information 'overload' and they restrict the sources they use, including following the work of particular agri-scientists. However they all said there is often insufficient information on particular issues. To that end F15 and F19 both commented that it would be more helpful if agri-scientists focused their research on the issues farmers want information on. F32 said, "A lot of them [agri-scientists] don't have a lot of knowledge of the practicalities of some of the stuff they come out with or its three years behind what farmers are doing."

Despite this criticism, agri-science information is valued by the participants in two ways. Participants describe agri-science as providing them with an understanding of the scientific principles behind specific aspects of farming such as soil management, plant diseases and animal health. F53 says, "…it explains the 'why' behind a lot of the 'what' that is handed down from your parents." Also participants said tertiary education provides skills to learn how to read and analyse agri-science research. However the participants argue that agri-scientists are not experts in farming systems generally or farming place in particular, and their information is not always appropriate or applicable on farm. It has to be evaluated by the farmer.

As noted in Chapter Two, Campbell et al (2009, p.93) describe the 'default setting' for agri-science as "…tightly disciplinary, production-oriented and blind to contextualities within which agriculture is embedded." Similarly, the participants criticised agri-science for its focus on increasing production, without considering costs or practicality to implement on farm. For example, F38 spoke of fodder beet being promoted as a higher yielding fodder crop but once he factored in the cost of the additional spraying and cultivation required, kale and swedes were better value. F53 spoke about research on lambing ewes up to five times in three years to increase lamb production (Morris, 2004; de Nicolo, 2008):

> "They are not thinking about feed demand and how sheep farmers, who are predominantly dryland farmers, would keep green feed up to in-lamb ewes in a dry Canterbury summer."

F52 said some of the things agri-scientists suggest "might be feasible when lambs are $150 a head but you've got to think about what happens when they are worth $50 a head." F05 summed up the collective story, "For every good idea that has come out of Ruakura [agricultural research institute] there are 100 silly ones."

Another criticism of agri-science is a history of products that do not work well on farm. F05 told of agri-scientists suggesting grass growth rates are the same across Taranaki, implying some farmers were better than others, when climatically the areas are quite different. F09 noted the poor performance of many plant cultivars once they move from field trials to commercial farming, and F28 noted the poor performance of the Borealis sheep breed. F38 said the advice from Invermay Research Centre was that weaner deer could be mated once they reach 60-65kg in weight, but at those weights the farmers were getting 60-70% conception rates. O'Connor (1983, p.57) writing on the relationship between science and farming in tussock grasslands, suggested;

> "If we are to profit from the bitterness of past experience we had better recognise that the organisational separation of science story-telling from utility story-telling is an effective way to secure irrelevant science and science-free mythology, simultaneously."

Writing at the interface of agricultural extension programmes and indigenous farming in developing countries, Scoones and Thompson (1994a, p.20) discuss the different perspectives of agri-science researchers and farmers;

> "…researchers and farmers use different frames of reference when thinking about agriculture. The researchers thinking is 'out of time'; they have the luxury to run their experiments in controlled environments, even when conducting on-farm trials. By contrast, farmers experiences can only occur 'in-time', where they are embedded in particular agroecological and sociocultural contexts…For the researcher then what counts is replication and comparison. For the farmer, what counts is fitting available resources to changing circumstances well enough to make it through the season."

The participants collect all manner of information about farming generally and about the family farm over generations. Often, non-indigenous intergenerational farming families are the only repository of a comprehensive written record of studies about place, over time, across a range of disciplines. Such libraries create diachronic knowledge of synchronic knowledge by providing a record of continuity and change in theories, models and concepts in agri-science and other sciences, over time. They illustrate how 'scientific' information and understandings change and that no form of knowledge is definitive or absolute. For example: F21 and F42 both commented on the liberal use of superphosphate fertilisers by farmers in the 1950-80s, "we were all following the advice of the professors at Lincoln". F16 told of soil scientists planting *Pinus* species on Crown land to manage scree erosion in the high country, plantings which are now sources of wilding spread. F11 said that in the early 2000s, wintering dairy cows on light soils was promoted by agri-scientists as the right thing to do, to get cows out of the mud; "No one knew about nitrate leaching then." Menzies (1970, p.142) observed, "Each generation tries out innovations. Fashions alter in farming as with women's clothes." This awareness of agri-science as variable and changing influences how participants use it and other science in their farming systems, and how they make changes to their farming systems, which is discussed in Section 6.4.

The participants' collective social memory of how 'scientific knowledge" changes over time is another point of difference in their way of knowing from planners and agri-scientists. Agri-scientists do not acknowledge that many of the environmental effects of farming have come from farmers following the advice of agri-scientists on ways to increase production; nor do they acknowledge the farmers who have, as F46 suggests, been sent 'down the wrong pathway.' Similarly, planners and policy-makers do not seem to acknowledge that in the past farmers have been encouraged to clear and develop their land by central and local government, or that central government still runs a policy to double the export value of New Zealand's agricultural products by 2025 (www.mpi.govt.nz; Smith et al, 2007) while simultaneously but disjointedly developing policy to address environmental impacts of farming on freshwater, indigenous biodiversity and greenhouse gas emissions (www.mfe.govt.nz).

The participants perceive that agri-scientists do not always recognise or respect farmer knowledge, and agri-science is the one knowledge source not shown in Figure 30 (p.117) as a 'two-way' exchange of information. F11 said, "they treat us like we are a bit thick" while F05 suggested agri-scientists, "…see farmers as a necessary evil in their research." F32 said,

> "looking back in my time at Dairy NZ there was certainly a view that dairy knowledge goes from the scientists and gets pushed out to farmers…and there is very little that goes the other way."

Matose and Mukamuri (1994, p.69) observed a similar disregard of farmer knowledge when researching forestry in Zimbabwean rural communities, describing it as occurring, "…without any serious attempt at understanding what farmers already know". Similarly, O'Connor (1983, p.52) in his work on the role of agri-science in tussock grassland management in New Zealand suggested,

> "It was largely through the work of Connor (1961, 1964, 1965 & 1974) that we learned how the practice of burning tall tussock grassland had made possible the management of short tussock grassland. Pastoralists had probably learned it nearly a century before."

Participants suggest the most valuable agri-science research is that which occurs alongside farmers. F38 said,

> "I think the agri-scientists learn from the farmers; well the good ones do. The Ivory Tower scientists never will because they are just not out there…it's got some 'street cred' [with farmers] if it's been put through the ringer somewhere…."

Despite a degree of scepticism about the on-farm practicality and appropriateness of some agri-science research, farmers do not seem to publicly challenge agri-scientists. Rather they simply 'take or leave' information as they deem appropriate. I asked the participants about this silence. F50 said, "you have to be very confident, accurate and articulate to start debating with academics," suggesting a power relationship between agri-scientists and farmers around perceived validity of knowledge. Cornwall et al (1994) and Scoones and Thompson (1994a) observed similar power relationships between agri-scientists and indigenous farmers. In the feedback session at Coalgate some participants said dairy farmers speak up at Dairy NZ field days: "…usually there is someone you [can] get to ask the questions." This may be a point of difference between dairy farmers and other participants or it may be that farmer criticism of agri-science is voiced but because that voice belongs to farmers at field days rather than academics in peer-reviewed journals, those criticisms are not heard?

While both diachronic and synchronic knowledge sources are used by participants, the most valued form of farming knowledge is diachronic knowledge. Where the participants' diachronic knowledge is inconsistent with synchronic knowledge sources, for example, with soil types shown on S-maps or official rainfall records as discussed in Chapter Four, the participants prefer their diachronic knowledge. Also, the participants describe a hallmark of being a 'good farmer' as moving away from agri-science guidelines or general models in favour of using your own judgement. F16 said young farmers rely too much on agri-science guidelines and models rather than developing their own 'eye' for stock or plant health. To that end, F15 does not weigh his deer but uses the more qualitative approach of condition scoring, "weight gain is historic: i tells me what they have done up until now, not what they are going to do next." Similarly, F29 does not use feed budgets to determine how much to feed his cattle but observes their behaviour, "animals are biodynamic systems not algorithms; they'll tell you if they are hungry." However F05 says models have value in teaching young farmers:

> "Getting a standardised measure for calculating dry matter in New Zealand was important in teaching young dairy farmers to work out how much to feed a herd of dairy cows without needing 30 years of farming experience."

Berkes (2012) argues that lack of acceptance of knowledge generated within different paradigms is not particular to Western science, and that indigenous knowledge holders can be skeptical or dismissive of Western science as well. In this research, the participants say they value Western science and agri-science as sources of information, but they are aware of its limitations. They tell of consulting agri-science literature throughout their farming careers on an 'as needed' basis to research specific issues from new plant varieties to animal health issues and, they identify specific agri-scientists whose work they follow. The arable participants speak highly of information from the Foundation for Arable Research and most dairy participants source advice from Dairy NZ or the Lincoln University Dairy Farm. Drystock participants tend to be more diverse in the sources of agri-science advice they use, though some younger participants mentioned Beef and Lamb NZ "Red Meat for Profit' programme as valuable. However, the participants were definite that agri-science does not lead farming and does not direct how they farm. Rather it is considered alongside the diachronic sources in the participants' decision-making process, as F37 said, "I think we all make up our own minds, they just feed in." Morris et al (1995, p.125) observed that farmers in their study group did not assume that new technology is always beneficial in terms of either farm production or mitigating environmental impacts but considered its applicability and viability within their own farm systems.

The narratives about farmer knowledge and the role of agri-science as a source of farming knowledge are significant for understanding potential conflict between farmers and environmental planning processes, in two ways. In Chapter One I referred to the planner at Environment Canterbury who told me there was no need to consult directly with farmers over freshwater planning processes because, "we will convince the agri-scientists and they will convince the farmers." However, the narratives challenge the notion of a simplistic technology-transfer relationship from agri-scientists to farmers. Secondly, the narratives challenge the notion that 'end-of-pipe' technology is available to address environmental impacts of farming, if only farmers would use it. The narratives outline many reasons why some agri-science technology cannot or will not be used by participants on-farm. In that context, F45 referred to a conversation he had with an Environment Canterbury Commissioner:

> "DC made the comment…that all this technology is out there that farmers can use to solve their problems but farmers will not pick up the technology… I thought, 'oh shit that's a dangerous comment because that makes us look like the dumb f###ers on the block' and I'm thinking what is all this technology you are thinking about? And one of the things he was thinking about is DCD's [nitrification inhibitors] which farmers are happy to use but the markets won't accept. And I said to him, 'you can't fight the markets' and he said, 'the markets will learn that it is harmless.' Well Sri Lanka banned all milk products from New Zealand for 12 months!"

6.4 Influences on Decision-Making Among Intergenerational Family Farmers

As discussed in Chapter Five, major land use change is not the norm for the participants, but their farming practices are dynamic. Farm systems are constantly adjusted in response to weather, markets and commodity prices, availability of stock or contracts, new technology and changes in circumstances. Decision-making occurs on daily, seasonal and longer timeframes. Irrespective of their farming and educational background, every participant described the same basic criteria and process for making decisions. The participants describe four consistent factors which motivate them to make a change in their farming system. Firstly, whether the proposed change complements the objectives of remaining in place and improving livestock or crop performance. Secondly, whether the proposed change fits within the current farm system or whether it will create additional work or require additional inputs. Chapter Five describes farming as the balancing of economic, environmental and socio-cultural factors. Every action has a reaction and any change in the system can have consequences in other parts of the farm system. Thirdly, whether the change can be accommodated within the farm budget. Changes which do not fit within the farm budget may still be contemplated, but consideration has to be given to the risks associated with funding it. Finally, whether the farmer is interested in making the change. As discussed in Chapter Five, all participants agree people have to be passionate about what they are farming to perform well.

Participants said the combination of the desire to remain in place and family farming traditions make them conservative about change and the first three criteria for decision-making reflect the goal of to remain in place. Therefore, while Figure 30 (p.118) included examples of farmer-innovation, those innovations make changes within farming systems rather than changing the farming system per se. Changes which do not fit within the current farm system or which create financial risk have the potential to threaten the ability to remain in place. It also reflects that farming systems are complex, contextual and fine-tuned over long periods of time, so changes that fit within the system are perceived as less risky. To that end, 'risky' change, for example converting to dairy farming or borrowing to buy more land or to irrigate the farm is only contemplated when maintaining the status quo will not enable the family to remain in place.

Tradition or family history can also influence decision-making. F02 are one of few farming families in New Zealand who sell wool under the family name (not a farm or company name), something they have done for over 140 years. This history creates pressure to continue. F28 said family history meant he kept farming mid-micron sheep for 10 years longer than he ought; "I didn't want to be the one who stuffed up the wool." F03 told of the difficulty of making the decision to change sheep breeds because his forebear was James Little who founded the Corriedale sheep breed:

> "That was a big thing for us. But James Little was a man who thought outside the square, that's why he invented the Corriedale, and I thought, if he was here and understood the market, he would probably say, 'what are you still doing buggerising around with these things?'"

Figure 34: Participants' Decision-making Process

Narrative	Quote
F10M42	"You have to do your own work. It doesn't matter who the expert is, people leave things out…they know it is not quite right but that's the amount of time they've got for it…."
F26M42	"We talk to a lot of people we think could give us good advice, throw ideas around…you can make mistakes as long as they are not too expensive and you don't make them twice…."
F46D23/1	"I have a good relationship with my banker and farm consultant and then I do a lot of researching, listening and having conversations with people…."
F29L43	"You figure it out, you experiment, you keep trying if it doesn't work discard it, if it does carry on....
F44M32/1	"The power of other farmers and listening to other farmers is really important…If there's a new venture I ring up a few mates and do wee experiments myself."
F15M23	"I'm quite fortunate I've got three other brothers farming and a father and we all share a lot of information. I'm always tweaking things… Every year the market is sending different signals and you are trying to work out what is happening. I don't do massive changes in one year."
F24D23/1	"As farmers we go exploring and go to field days and look and think. ..I'm one of those that's a bit more gradual….put a toe in the water and see. If that works, I might put the whole foot in."
F37M33	"It's your experience over the years that tells you what you can and can't do…I'd get as much information as I could from various sources and weigh them all up…I'm not an impulsive person."
F30L23	"One of my weaknesses is that I can be very quick to change… so I've been trying to limit myself to doing it [change] at a small scale first because you don't always know how it is going to affect other parts of your system."
F41H13	"I certainly found in a farm business if you change one thing you change everything…Continuity in management is fairly important…"
F47L43	"I think there is an element of conservatism, that heritage creates more pressure because you cannot muck up and sell up and move on because you value staying here…All farmers go through a cycle of being developers, consolidators and distributors. When I was 20 and up to 40 I'd happily put my neck on the block because if it was a disaster you had time to recover, when you are touching on 70 it's a totally different approach."

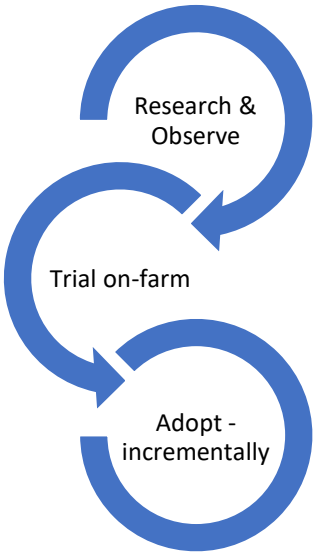
Figure 34 above includes examples of how the participants describe their decision-making processes on farm. There are three key elements identified in the narratives. Firstly, the farmer controls the decision-making process. They may take advice and gather information from a variety of sources but they make the decision over whether, when and how to make change. Morris et al (1997) and Kenny (2011) have observed similar patterns of independent decision-making by farmers in their research into land use change in the MacKenzie Basin and climate change adaptation among farmers in eastern areas of New Zealand, respectively. Maintaining control over decision-making is essential to remain in place and, as noted in Chapter Four, the two most important factors that influence farm income, weather and prices, a farmer cannot control. Stapleton-Smith (1990, p.198) adds 'government policies' to that list of matters which affect farm income and which the farmer cannot control. Therefore control of all other aspects of farming is important.

As F11 and F15 note, the costs of any mistakes are borne by the farmer holding the cheque book, not the farm advisor, agri-scientist or any other party. Therefore, no participant tells of making changes to how they farm solely on the advice or recommendation of other parties. Rather, participants carry out their own analysis of the impacts of changing their farm systems and make the decision when they are satisfied it is the best (or only) option. Secondly, the decision-making process is considered and gradual. Morris et al (1995) and Stock and Peoples (2012) both identifed farmers in their dairy study groups who were seen as early innovators and 'risky' and those who are 'gradual adaptors' of new technology, but every participant in this research described themselves as a 'fast follower' or a 'gradual adaptor' rather

than a leader in innovation. F30 said he has a tendency to make hasty decisions, which he identifed as a weakness in farming, and he is trying to be more considered. F12 said if he is convinced from the outset that something is right for his place he will jump right in, but otherwise he prefers to wait until he sees it working on other farms. I argue, this is a characteristic of non-indigenous intergenerational family farming culture: these farmers are cautiously innovative – prepared to change but only when they are confident such change will not threaten their ability to remain in place. This may explain why they are 'farming survivors', rather than 'farm developers' who F34 observed, "limp out of the valley after five years." The participants all suggest that changes to farm systems take around three to five years to implement and F11 observed that pace of change is one of the sources of conflict between farmers and the environmental planning process, "while central or local government policy on farming can change quickly, farm systems cannot."

Nuthall (in Williams, 2019) relying on data collected from a farmer survey about stressors (Greig et al, 2015) describes the most stressful issue for New Zealand farmers as rules and regulations. However, no participant in this research described the need to comply with regulations generally or environmental regulations in particular, as a main reason to make changes to their farming system. It may be the respondents in the survey Nuthall (2019) relies on have different farming motivators and practices than the participants in this research, or it may be that while farmers find rules and regulations stressful they are not, in themselves, a motivator for making changes to farming systems. This latter conclusion is consistent with the findings in the case studies in Chapter Seven where participants only comply with rules and regulations if they agree they are appropriate, or compliance is necessary to be able to farm, for example, if they require planning permission for irrigation or effluent disposal. To that end, the ability of the environmental planning process to effectively address environmental issues associated with farming may be limited by its underlying assumption that people comply with regulations simply because they are regulations and have legal effect.

Figure 35: Process for Making Changes on Farm



Irrespective of their farming background, the participants all described the same process for implementing changes on farm. That process is depicted in Figure 35 (p.130). Firstly, the participants research as much as they can about a product or practice and try to observe it on another farm or talk to farmers who are using it. Then, if they are convinced the product or practice is appropriate for their farm, they undertake a small trial, "…usually in a back paddock where no one can see" (F15). Finally, if the trial is successful, the product or practice is gradually incorporated into the farming system. This decision-making process differs from some of the literature on farmer decision-making, for example, Long (2013) and Nuthall (2017) both argue that farmers' decision-making is largely 'intuitive' and can be enhanced by adopting more evaluative decision-making processes. These observations may be correct in relation to the research participants studied by Long (2013) and Nuthall (2017) but the participants in this research have described a very rational and deliberative decision-making process. As noted in Chapter Two, research findings become problematic when they are generalised as applying to all farmers. It reinforces perceptions that all farmers are, to use F45's description above, "the dummies on the block" whose farming practices would benefit from the uptake of advice from agri-scientists and planners.

6.4 Conclusions and Reflections

The participants hold detailed, complex and comprehensive knowledge of their local environment and how to farm to that environment. The narratives of the Canterbury-born participants analysed in Chapters Four and Five describe a level of knowledge about farming with soils, landscapes, weather patterns and ecosystems that I argue would be hard to match unless other experts had been studying that area in-depth. The narratives about fertiliser and irrigation described in Section 6.1 reinforce the comprehensive and complex nature of the participants' place-specific knowledge. In this context, conflict between farmers and the environmental planning process is inevitable if the latter attempts to advise those farmers about how to farm place. However, the extent to which farming systems are adapted to local environmental conditions increase with the participants' longevity in place. Not all participants, and not all farmers, have the same knowledge about farming place and the question for me is how the environmental planning process can recognise and utilise such expert knowledge where it exists, rather than cutting across it and creating conflict?

The participants acquire their knowledge of farming through a combination of diachronic and synchronic knowledge sources: it is a blended epistemology sharing ways of knowing with Western science and indigenous farming cultures, along with its own place-attachment relationships. This blended epistemology of farming is consistent with the educational backgrounds of the participants, being a mix of farming knowledge acquired growing up on the family farm, their own farming experience, and from formal secondary and tertiary education. However where the two knowledge sources are inconsistent, for example in identifying soil types or rainfall patterns, the participants consider their diachronic knowledge sources are more appropriate. Duncan (2016) observed this preference for diachronic knowledge among farmers in her study of water quality issues in the Hurunui and Selwyn catchments. She describes a scepticism among her participants towards the science being used by Environment Canterbury to both identify and manage water quality issues in those catchments. The participants in this research do not describe an inherent mistrust of or scepticism towards science as an information system, rather they describe an awareness of the limitations of synchronic knowledge when it is used in

place-specific contexts. To that end, participants value agri-science and other science as sources of information on a range of farming-related topics. However the role of agri-science in farming knowledge and decision-making differs from the knowledge hierarchy described in Chapter One whereby 'planners will convince the agri-scientists and they will convince the farmers.' Rather, the participants view agri-science as expert knowledge on particular topics which they consult as required. They do not regard agri-science as expert knowledge of farming systems generally or farming their farm in particular: that expertise lies with the farmer.

The interpretation and analysis of farming knowledge in this chapter highlighted for me the extent to which agri-science literature is focused on particular strands within a complex body of knowledge and practice called 'farming'. Yet as discussed in Chapter Two, agri-science is relied upon by environmental policy-makers and planners to understand farming and farmer-environment relationships in New Zealand; agri-scientists are perceived as the 'experts' in farming. To that end, the environmental planning process may be more effective in engaging with farmers if it recognises farmers as holding expert knowledge of farming place and agri-scientists as having expert knowledge of the particular topics in which they research? Pawson (2018) argues that social innovation is at least as significant as scientific innovation in farming, as it applies to research on biological economies. To that end, a second related question I have is why other knowledge of farming such as social science research which explores farming as a relationship of people to place, is not recognised in the environmental planning process?

McLauchlan (1981, p.27) argues that colonial farming in New Zealand started in an era when mythology had ended in favour of observation and science and I wonder where this 'image' of New Zealand farming as 'scientific' or 'technical' masks socio-cultural aspects of farming such as attachment to place and having a reciprocal relationship with nature? Scoones & Thompson (1994a) suggest one of the 'silences' in research on indigenous farming practices is its link to spiritual beliefs because of a concern among researchers to not undermine its credibility with Western agri-scientists. I wonder if non-indigenous intergenerational family farmers in Canterbury are silent on the 'non-economic' and 'non agri-scientific' aspects of farming for similar reasons? Does that behaviour link with the agri-reforms of the 1980s described in Chapter One, and the emphasis since placed on family farming as a business of economic production, at a socio-political level?

The degree of consistency between the narratives over the use of agri-science information and advice surprised me. I was anticipating more variation in the narratives, perhaps along the lines of McLauchaln's (1981) suggestion that dairy participants may place greater emphasis on agri-science than other participants. I have argued that the North Island-born dairy participants tend to rely more on industry guidelines for their fertiliser and irrigation use than the Canterbury-born participants. However when it comes to farm decision-making the themes across all the narratives are consistent: the participants control the decision-making process and decide what information they will consider when making decisions. The participants' decision-making process is designed to achieve the participants' goals of remaining in place and balancing the economic, environmental and socio-cultural factors that constitute farming the family farm. Compliance with environmental regulations or following the recommendations of agri-scientists are not identifed by the participants as directing their decision-making, though information

from agri-scientists or other advisors may be sought as part of the process. This pattern of decision-making may be specific to the research participants or to non-indigenous intergenerational family farmers per se, reflecting their strong farming backgrounds and knowledge.

As a blended knowledge system, I wonder whether the participants' ways of knowing may be recognised and provided for within the environmental planning process in Canterbury more readily than an environmental management system completely divorced from Western science? However, there are still some significant differences to overcome, including assumptions about the role of agri-science in farming and who holds valid knowledge discussed in this chapter, along with more fundamental assumptions about farming, human-environment relationships, and economic-environment relationships discussed in Chapters Four and Five. To test the matter and answer the second research question, two case studies in Chapter Seven examine causes of conflict between participants and the environmental planning process and how they may be reconciled in relation to two issues: the protection of conservation sites; and managing the effects of farming on freshwater.

CHAPTER SEVEN Farming & Environmental Planning: Case Studies of Conflict

Sustainability?

They mutter of erosion

In their office of glass,

And say this block should be retired

Before another season's passed.

They speak of soils and water

And the values they hold grand,

Then go and build another suburb

On some market garden land!

(Morris J, undated, p.22)

7.1 Introduction

As J. Morris's (undated) poem suggests, some farmers have definite views about the efficacy of environmental planning processes in addressing environmental issues. In Chapter One, I outlined how this research emerged from my observations of conflict at the interface of farming and environmental planning processes in Canterbury, New Zealand; conflicts that I did not think were explicable as a simple 'economic versus environment' proposition. I described two examples of this conflict. Firstly, the identification and protection of wild ecosystems or sites with conservation value on farm, colloquially referred to as significant natural areas or SNAs, and outstanding natural features and landscapes or ONLs. Secondly, the planning process to manage effects of farming activities on freshwater quality resulting from the dairy boom in Canterbury at the turn of the century. This chapter comprises case studies of both issues. For each case study: firstly, the issue is explained; the conflict between participants and the environmental planning process is described from the participants' perspectives; then each case study outlines how participants said they would manage the issue, if they could 'hold the planner's pen'.

Because of the contemporary nature of the case studies, only the narratives of the oral participants have been interpreted and analysed. However all the narratives (oral and written) include anecdotes of conflict between farming families and central or local government bureaucracy over land planning or other environmental issues, from the very earliest period of colonial settlement to today. For example, Hodgkinson (1856) and later Burton (1938) both wrote of Wakefield's failed scheme to create Canterbury as an agricultural colony because he did not consider the nature of the land and distance to markets, both of which better suited pastoralism. Both oral and written narratives tell of land being acquired from the family farm by the government to create rehabilitation farms for soldiers returning from World War I, and those rehabilitation farms failing because the government surveyors did not heed the advice of the farmers (F02, F38, Blakiston, 1952; Menzies, 1970; Woodhouse, 1982; Gibson, 1990). Burton (1938, p.164) describes the process as follows:

> "The townsman who…proceeds to subdivide them… is often ignorant of some of the facts. Summer country is useless without corresponding winter country; it is easier to draw a fence line on a map then to erect it on the ground….some country will only carry a sheep to every 4 or 5 acres…."

More recently F17 and F46 both tell of Environment Canterbury planners wanting to impose minimum flows [levels of water] on local drains "…they obviously had no idea what a drain is for" (F17). In another example, F40 told of being 'laughed out of the office' of Environment Canterbury for suggesting the council was allocating too much water to irrigation in his catchment. That catchment is now classified as 'over-allocated' for abstraction in the Canterbury Land and Water Regional Plan (2012, 2016). Morris et al (1997) observed a similar scepticism towards bureaucracy among farmers within the MacKenzie Basin in South Canterbury: "Bureaucrats…do not understand the conditions under which landholders operate and they neither understand nor care about the realities of farming life."

In Chapter Four I argued that the participants have a relationship to the family farm as an attachment to place, and those who are non-indigenous intergenerational Canterbury farmers hold complex, comprehensive place-specific environmental knowledge. I suggested that in such circumstances conflict with environmental planning processes is inevitable while the latter assumes farming is an 'economic versus environment' proposition and proceed to 'advise' farmers who hold this level of farming knowledge on farming and environmental management. Similarly, in Chapter Five, I described the participants' understandings of farming as an activity, and the different ways in which participants manage environmental impacts of farming. In particular, I argued environmental management systems based on concepts such as matching land use with natural capital and farming with wild ecosystems, do not align with environmental planning processes. The latter address environmental impacts using what Le Heron (2018) describes as a 'single-issue' focus and 'end-of-pipe' technology, and protect wild ecosystems using what Howitt (2001) and Berkes (2012) describe as Western conservation strategies centred around the notion of separating 'protected land' from 'production land.' In this chapter, I analyse the extent to which those same arguments can be applied to the two case studies. Through interpreting and analysing how the participants say they would address these environmental issues if they could 'hold the planner's pen', this chapter begins to address the second research question; how alternative environmental management systems based on different ways of knowing can be reconciled? This theme of recognising and reconciling different ways of knowing and doing environmental management in environmental planning processes is further addressed in Chapter Eight.

7. 2 Case Study One - Managing Indigenous Biodiversity on Farm

7.2.1 Background

New Zealand's geographic isolation over millions of years has created unique ecosystems: 85% of New Zealand's seed plants and 41% of ferns are endemic along with relict fauna such as tuatara, primitive frogs and ground-dwelling birds (Gladsby, 2000, p.144). New Zealand's relatively late and rapid colonisation by Māori and later European settlers resulted in substantial environmental change over short periods of time (Cumberland, 1983; Gladsby, 2000). Polynesian land uses are estimated to have resulted in deforestation of approximately one-third of New Zealand's total land area and the extinction of 12

species of moa and another 21 bird species; while European settlement resulted in the deforestation of half of New Zealand's remaining forested areas between 1860 and 1920 (Gladsby, 2000, p.145; Jay, 2000). By 2000, native bush covered 22% of New Zealand's land area, wetlands 1.2%, and tussock lands less than 10%, compared with pre-European estimates (Gladsby, 2000, pp.145-146).

The planning response to New Zealand's decline in indigenous biodiversity has occurred in three stages. In the late nineteenth and early twentieth century, individual species such as tuatara and kiwi were protected, along with individual tracts of land, each under its own statute. Post-World War II, a more co-ordinated national response was established with the enactment of the Wildlife Act 1956 and the National Parks Act 1952 (Kennedy & Perkins, 2000). However, indigenous biodiversity protection remained focused on Crown land or voluntary initiatives on private land such as covenants with the QEII Trust which, as outlined in Chapter One, was a programme established by farmers in 1977. It was passing of the Resource Management Act 1991 (RMA) that introduced a statutory duty on all land to recognise and protect outstanding landscapes and natural features (ONLs) and significant areas of indigenous flora and habitats of indigenous fauna (SNAs) (RMA, s6(b) and (c)).

As described in Chapter One, local authorities in Canterbury discharged these duties under sections 6(b) and (c) of the RMA by mapping SNAs and ONLs in district plans, accompanied by a set of rules requiring planning permission (a resource consent) to remove indigenous vegetation or undertake activities such as earthworks, tree-planting or building in or near those areas. In most cases, the areas were identified by ecologists and landscape architects using aerial photographs and data from previous studies. Farmers in Canterbury (and elsewhere in New Zealand) opposed this process; in some cases prohibiting local authority staff from entering their property for any purpose. As noted in Chapter Two, this issue has not been well-documented in academic literature in New Zealand. Academics who have commented on the issue tend to explain the tension as a conflict between economic and environmental values (Cocklin et al, 2002; Jay, 2005; Miller, 2011). Miller (2011, p.81) observes that regulatory approaches to managing indigenous biodiversity in New Zealand have proved challenging and suggests, "…other methods than rules in plans may be more effective."

Despite the controversy, and Miller's (2011) plea for other methods, the environmental planning process in New Zealand perseveres with this approach of listing and regulating SNAs and ONLs. For example, in 2019 Environment Canterbury publicly released draft maps showing 'indicative' wetlands on farms in Canterbury without consulting landholders or verifying the accuracy of the mapping with site visits (www.ecan.govt.nz). Similarly, the proposed National Policy Statement on Indigenous Biodiversity released in November 2019 directs local authorities to identify and map all sites that meet specified criteria as SNAs in regional or district plans by 2025 (Department of Conservation and Ministry for the Environment, 2019). The document suggests councils work with landholders to identify SNAs where possible but argues for the use of aerial photographs and other data to identify sites where access is not allowed (Ibid, p.20). The 'Section 32 Evaluation and Cost-benefit Analysis of the Proposed National Policy Statement on Indigenous Biodiversity' states this approach is required due to, "…on-going decline in biodiversity" (Department of Conservation and Ministry of the Environment, 2019a, p.22), noting that 39% of district councils in New Zealand have not listed SNAs in their plans. The document does not identify

whether the 61% of district councils who have listed SNAs in their district plans have had better results with halting declines in indigenous biodiversity compared with their counterparts, nor does it explain how listing SNAs in district plans will halt the decline of indigenous biodiversity.

As noted in Chapter One, history has shown that farmers cleared indigenous vegetation and drained wetlands in Canterbury (and elsewhere) but as Pawson (2001) suggests those activities reflected the social values of the time; during the 1970s farmers received fiscal subsidies from the New Zealand government to clear land for farming. Yet, in Chapter Four, I described the number of sites on farms being managed by the participants for their conservation values as an 'underground conservation network.' In some examples, it has been the landholders who have 'saved' these sites from being damaged or destroyed. For example, F02, F06, F16 and F38 all placed QEII Trust covenants over wetlands on their farms to protect them from being drained by local authorities or flooded as part of a community irrigation scheme. As noted in Chapter One, many farmers have been involved in voluntary programmes to identify and protect conservation sites on farm, including: the QEII Trust established in 1977, which has 4600 covenantors and has protected over 189 000 hectares of land; and the Recommended Areas for Protection (RAP) Programme established by the Department of Lands and Survey in 1982. Similarly, since its inception in 2001, the Banks Peninsula Conservation Trust, also established by local farmers, has covenanted 1 460ha of farm land on Banks Peninsula/Te Pātaka o Rakiahautu and manages another 13 500ha of farm land to provide habitat for sea birds (http://www.bpct.org.nz). Figure 16 (Chapter Four) shows that of those participants with conservation sites on farm, over half do not have any formal protection and, for those that do, a covenant with the QEII Trust or similar, is the mechanism of choice. QEII Trust covenants protect sites in perpetuity: the covenant is registered on the Certificate of Title and binds all future landholders. They can only be removed with the agreement of the Trust and only then if the site no longer has any conservation value (www.qeiinatioanltrust.org.nz). Arguably these covenants are more enduring than listing a site in a district plan which is reviewed every 10 years. Considered in this context, it becomes apparent that the reasons why some farmers oppose the listing of SNAs in district plans is not an 'economic versus environment' proposition. It begs two questions: what is it about the process of listing SNAs in district plans that causes conflict with the participants; and why does the environmental planning process persist with this approach?

7.2.2 Participants' Experiences & Perceptions of SNA Process

As described in Chapter Four, many Canterbury-born participants have sites and areas on the family farm that have high conservation values and form an integral part of the farm. Pictures of some of those sites are shown in Figures 36a to 36c. Most dairy participants did not have any SNAs on their farms, and most arable participants had small sites adjoining waterbodies or vegetation located on the margins of production land. However all participants were familiar with the environmental planning process for listing and protecting SNAs.

Figure 36a: Whakamatau/Lake Coleridge & 16ha wetland (foreground) protected by QEII Covenant (F02)

Figure 36b: Wetland was drained in 1930s but restored in 2000s & used for water storage (F22)

Figure 36c: Award winning indigenous bush remnant & new planting protected by covenant (F26)

Figure 37: Participants' Comments on SNA Planning Process

Narrative	Description or quote
F03L33	"There are two basic fundamentals in my view: one is property rights; and the other is the undeniable value of biodiversity and most farmers will agree it is valuable and unique… the way ahead will only be achieved…with the co-operation of landowners... You have to include them; you cannot do it by rules and distant decrees…."
F06L43	"In an ideal world everyone would want to protect them [wetlands] but private property rights are very important to me. You can push so far but if someone owns the land they own the land."
F07L42	"The SNA was around this area and included the garden, the woolshed, the yards, the poplars, the forestry block… Here you are loving the same thing…doing everything you can to enhance it…it felt like a smack in the face…It was nothing to do with wanting to develop the area. It was all about the principle and we could see that this system…was not a good system."
F08L43/1	"Just picking areas and fencing them off is not achieving anything from a sustainability point of view… People are more willing to do things voluntarily then being beaten by a big stick…putting wildlife into an enclosed reserve is [great for] rats – so we graze ours to ground level & the rats hate it…so in [that] way we protect the lizards…"
F12L23	"They say ooh there's a lovely bit of kanuka up here and it probably should be fenced off and looked after. And I'm going hang on it's impractical to fence, it would require two flood gates that are going to blow out every time it rains and the stock are better to graze underneath it. I just make sure I don't spray it, look after it and leave it."
F27L43	"ECan aren't (sic) interested in helping us do anything with our wetlands…they have given us a nice set of rules for them instead…All the work has been done by Alasdair and his father…they could have ripped them all up but they didn't and now there is a price to pay…there's no reward for good behaviour…instead they want this all fenced off, well show me a fence you can keep up in peat?"
F31D23	"Going to talk to someone...is far more effective than putting a plop on a map. The only reason I even knew about the wetland was because they sent us a letter saying you've got this SNA and they got me in a really grumpy mood because I thought bugger that we haven't got an SNA…"
F34H23	"When they did the valley they circled every single bit of bush. I wasn't going to do much with it [the bush] anyway, it's not millable…but we had to negotiate those areas with coprosma in it. They said they were the best sites in Canterbury… We are supposed to own it, but it gets taken away…."
F41H13	"It's a real disappointment of mine that councils and the regulatory environment take biodiversity and turn it into a liability when really this stuff should be valued…[so] if you have something of low or marginal value the incentive is to get rid of it…to continue to be the manager of your land you've got to try and eliminate anything which has that threat of becoming significant biodiversity."
F42H23	"I think if we left farmers alone and QEII Covenants have proven that…we love the land and are actually attached to it more than new farmers or corporates or the dairy sector… However because of the risks… I'd say get rid of everything you can while you can because if you don't you will probably never be allowed to farm it again."
F47L43	"I remember the Recommended Areas for Protection programme when the students came around…. The project was done by students who had no practical experience and if in doubt just make the circle [on the map] bigger and it got hoodwinked by the district council without proper consultation… I think that was part of the problem."

Figure 37 above contains quotes from the narratives of how the participants describe their experiences with environmental planning processes for identifying and protecting SNAs and ONLs. The narratives describe four causes of conflict between participants and the environmental planning processes, none of which relates to a desire to develop the sites. The first cause of conflict occurs because the environmental planning process does not recognise these conservation sites as part of the family farm, or the role of landholders as custodians of those sites. Participants speak about the process as disrespecting private property rights and of planners not consulting landholders before they undertake the mapping process. F11 said, "they don't ask they just take." F27 described their conversation with an ecologist from Environment Canterbury about the wetlands on their family farm:

> "We said, 'what would be the ultimate goal for the property?' He said, 'you would gift it to Canterbury'. We knew then they did not want to help us manage our wetlands, they wanted to take them away."

These narratives accord with the farmer-farm relationship story told in Chapter Four: the importance of maintaining control over place to remain in place and intergenerational family farmers earning the right to speak and decide for place. Also they are well-recognised causes of conflict within Transaction Planning Theory (Friedmann, 1973, 2008; Friedmann & Huxley,1985; Carroll & Hendrix, 1992). In their case studies of planning processes for river protection in the USA, Carroll & Hendrix (1992, p.351) suggested that conflict between federal planners and local residents and ranch owners was "more about issues of control than the substance of the proposed actions or regulations." They suggested that, in some cases, local residents saw themselves as, "…the unwilling recipients of planning expertise" (Ibid, p.350). Carroll and Hendrix (1992) posit that it is in the early stages of planning processes that locals search for clues concerning how to define the state planning presence and how to respond, and that early relationship building and honest negotiation is critical. It seems those same issues remain today. With his permission I have included an email from Hurunui family farmer Jeff Wilkinson (22nd July 2019) to Environment Canterbury in response to the wetland mapping process described above:

> "It is always annoying to find out through the media…that we have areas of our properties mapped as either wetlands, riverbed lines or other landscape issues. Our first opportunity to respond…is generally though an ECan submission process or public meetings….These meetings also have members from other organisations having their own agenda to push and…[who] have more sway than the landowners affected….These people leave these meetings and go onto wherever they live and carry on with life, we go home and live with what you are proposing to place on us. One would have thought the most obvious way forward for any of this would have been…[that] the first people to be approached are those that are directly affected… If there is a problem environmentally or due to a plan or rule change, then that is the starting point…. If ECan ever want to get rural Canterbury on side, then start with some respect to those that you are going to affect with your planning and mapping and do them the courtesy of approaching them first."

The second cause of conflict relates to the accuracy of the information that is identifed and mapped as SNAs. Some SNAs were mapped considerably larger than the actual site, mapped in the wrong place, or did not exist. F07's house and garden were included in the SNA mapped for their farm and F31's 'wetland' (which was mapped off an aerial photograph) was a patch of gorse. F10 had springs mapped on his farm that do not exist: "I said come with me and I showed them, no springs…I've asked three times so far [to have the maps corrected]." Carroll and Hendrix (1992) identify inaccurate or incomplete information as a major source of conflict between planning agencies and local residents, as it can engender feelings of mistrust with the planning process from the outset. As noted in Chapter Six, the participants consider the most appropriate knowledge about the family farm is diachronic knowledge. Consequently, they are sceptical of the credibility of environmental planning processes that do not use place-specific knowledge and site visits. F10 described his experience with the planning process for the Waipara River:

> "We ran into desktop problems, desktop studies, bloody hopeless… One of the guys…overseeing the Waipara River, I said to him, 'have you been up the Waipara River?' He said, 'I've flown over it.' He was in charge!"

The third cause of conflict is around the participants' perceptions of the efficacy of the regulatory approach for protecting SNAs on-farm. They describe the process as 'just words on paper' while protection requires these sites to be actively managed to avoid them being overrun by plant or animal pests, to erect and maintain fencing where appropriate, and to undertake additional planting. F07 suggests that the most significant threat to indigenous biodiversity today is the spread of plant and animal pests. Participants involved in extensive dryland pastoralism said the rules for protecting SNAs in particular or indigenous biodiversity generally, are impractical to farm with. Rules that prevent stock access or the removal of any indigenous vegetation capture grazing, access to stockwater, the use of tussock blocks for lambing and summer grazing, the ability to erect or maintain fences or access tracks and to manage pests; all activities that remove individual plants, but do not affect the ecological integrity of the sites. This conflict in ways of knowing land management mirrors that between Western conservation strategies and TEK systems noted by Howitt (2001) and Berkes (2012), which I have referred to in Chapters Two and Five.

Participants said that the planning process is hard to engage with. Applying for planning permission to undertake farming activities in or around SNAs is costly, slow and uncertain, and therefore inappropriate for day-to-day farming activities. District plans are described as long, technical documents which are hard to read and hard to access. F08 commented, "I enjoy reading agri-science papers…but reading that district plan stuff, you soon lose the will to live." To that end, while all the participants are aware that there are likely to be rules around clearing indigenous vegetation or draining wetlands, they do not know precisely what those rules are or, in some cases, if their sites are listed as SNAs in the district plan. Rather, as described in Chapter Six, the participants manage their conservation sites based on their own knowledge and advice they may acquire from independent ecologists or researchers. However, all the participants know whether they have a QEII Trust Covenant on their site and the content of any associated management plan for that site: they have been enactive in those processes.

The fourth cause of conflict is tension within assemblages engaged in processes to manage SNAs, in particular, the collective social memory of the participants and the lack of collective memory in environmental planning processes. The environmental planning process is not embedded: it is not contextual and it is not resident in the same human bodies from transaction to transaction. the participants or their parents have been dealing with the SNA planning process since the early 1990s, earlier if they were engaged in the Recommended Areas for Protection Programme with the Department of Lands and Survey in the 1980s, noted in Chapter One. They know the history of these research processes and the original conditions upon which they engaged. F47 pulled out the letter he received from the Department of Conservation in 1987 inviting him to participate in an ecological survey of his farm and assuring him the data would not be used without his consent. Undoubtedly, the process of taking data obtained in one research project and using it for another without the participant's permission is a breach of most modern research ethics, yet to the best of my knowledge that breech has never been formally acknowledged by either the local authorities who requested the information or the Department of Conservation who supplied

it. When I discussed with Environment Canterbury staffers farmers' reactions to their wetland mapping process undertaken in 2019, they were unaware of this issue with the earlier SNA process in Canterbury. However, as Jeff Wilkinson's email attests, for the participants' it was 'history repeating itself.'

7.2.3 Managing Conservation Sites on Farm – The Participants' Approach

F04, F12, F26 and F50 told of positive experiences working with their district councils in protecting conservation sites on farm. There were three common factors between their narratives: the participant was in control of the process; they described the staffers they worked with as personable, knowledgeable of farming, and respectful of landholders' efforts to protect sites; and the management of the sites was negotiated with the landholder. These factors reduce the potential for the conflicts identifed in Section 7.2.2 above by recognising the custodianship of the family and using place-specific diachronic knowledge. These narratives illustrate how conflict between participants and environmental planning processes may be reconciled. The participants' narratives were consistent about how they would manage SNAs or ONLs if they could 'hold the planner's pen.' No one said they would not protect SNAs or ONLs on farm because the economic gains of developing these areas outweigh the environmental values of protecting them. However the processes they describe align closely with Transactive Planning Theory and the processes used by the QEII Trust and described by F04, F12, F26 and F50. The three key features of the participants' preferred process to recognise and protect SNAs on farm are: the need for landholder agreement; the use of site-specific management plans; and recognition of extensive, dryland pastoralism as an appropriate environmental management system within SNAs.

F14 suggested that if a site is nationally iconic, compulsory protection may be warranted but in that case compensation should be payable to the landowner. All other participants were adamant that SNAs should not be listed or protected without the agreement of the landholder for two reasons: because they own the land; and because in practice sites cannot be protected without the co-operation of the landholder. As discussed in Chapter Two, Transactive Planning Theory assumes that all conflict is reconcilable through dialogue and mutual learning. It assumes mutual control of the process between planner and client and does not contemplate the issues of a client refusing to co-operate. Therefore, I asked the participants how a voluntary approach would work with landholders who do not value conservation sites? The participants all said that if the landholder does not value the site, it will not be protected long-term regardless of any listing in the plan. F06 said, "it is the hallmark of a good farmer to value these areas but to be effective it has to come from within" and F38 said, "if the landholder is not passionate they [SNAs] are not going to be looked after properly…." In essence, the participants are saying there is little value in regulation as a fall-back position because it is ineffective in that form. This view is consistent with the observation I made in Chapter Six that the participants do not consider compliance with environmental regulations to be a key factor when making decisions on farming place. As a planner I found the notion of not using regulation as a 'fall-back' position challenging, logical when I thought it through,, but challenging at first. It made me re-examine the 'taken-for-granted' role of regulation as coercion in both modernist and post-modernist planning theory and the influence that has in the assumptions I (and probably other planners) make about the efficacy of environmental regulation.

The participants all said that conservation sites need to be assessed and managed individually, because every site differs. Therefore, they prefer site-specific management plans over generalised rules. They argue those plans ought to be developed with the farmer to ensure they are practical to implement with the farming system and because farmers are more likely to adhere to a management plan that they have helped develop. The participants suggest a more effective role for environmental regulators than listing sites and making rules, would be providing (free) assessments of the ecological values of sites and resources to help landholders with pest management, fencing where appropriate, and additional plantings. Several participants observed that councils usually have only a few thousand dollars in their annual budgets for biodiversity enhancement but have 'million dollar budgets' to fund the district plan process. To that end, the 'Section 32 Report" for the proposed National Policy Statement for Indigenous Biodiversity estimates the cost for councils to identify and list SNAs in district plans at between $NZ1-1.5m per council (Department for Conservation and Ministry for the Environment, 2019a, p.36). Apart from the scenario described by F14, no participant suggested farmers should be paid compensation for the value of farm land which is managed as a SNA.. F48 is involved with the QEII Trust Board. He spoke about attending an international conservation forum where representatives from other countries expressed surprise that New Zealand farmers place private farm land into covenants with the QEII Trust without being paid compensation. However this position is consistent with the narrative told in Chapters Four that conservation sites are an integral part of the family farm and the participants' sense of duty to maintain them.

As aforenoted, there are examples in Canterbury (and elsewhere) where local authorities have engaged with landholders over the identification of SNAs on their land and in more recent plan reviews some local authorities have made provision for landholders to submit biodiversity management plans, for example the Hurunui District Plan (2018). However these actions occur within a planning process driven by Rational Planning Theory and two underpinning assumptions: firstly, that SNAs need to be listed in plans to protect them and the purpose of consultation with landholders is to gain site-specific knowledge and neutralise opposition; and secondly, that regulation is the most appropriate method to protect sites. Therefore any biodiversity management plan ought to be approved and implemented through the regulatory process (a resource consent). These assumptions are consistent with the assumptions I argued in Chapter One underpin the environmental planning process, namely that: all farmers are motivated solely by economic values; therefore, conservation values are best maintained if land is separated into 'protection land' and 'production land'; and 'protection land' is best managed by regulation. Until those underlying assumptions and the structures which reinforce them in the environmental planning process are successfully challenged, conflict will remain.

7.3 Case Study Two – Management of Effects of Farming on Freshwater

7.3.1 Introduction

As noted in Chapter One, the latest 'environmentally impoverishing commodity boom' (Pawson, 2018c, p.256) in New Zealand agriculture is a dairy boom that began around the turn of this century. Export earnings from dairy products have increased from just over $2 billion in 1990 to $17.2 billion in the year ending March 2018 (www.statisticsnz.govt.nz; Dairy NZ, 2019); and the national dairy herd has expanded from three million dairy cows in 1982 (www.statiscticsnz.govt.nz) to 4.99 million cows in June 2018 (Dairy

NZ, 2019). Whereas dairy farming in New Zealand has traditionally located in higher rainfall areas and on deeper soils (Le Heron, 2018) this dairy boom is associated with in a new model of dairy farming in Canterbury, undertaken on lighter, free-draining soils supported by irrigation and use of nitrogenous-based fertiliser to stimulate grass growth (Scott, 2015). This form of dairy farming both demands and allows larger dairy herds and higher stocking densities than occur in traditional dairying areas in Canterbury (Morris et al, 1995). Between 2002 and 2015 the number of dairy cattle in Canterbury increased from 542 600 to 1 254 000 (Knight, 2018, p.133) supported by a significant increase in irrigation. By 2009 Environment Canterbury had consented 600 000ha of land for irrigation and the impacts were becoming apparent in the flows in lowland streams and groundwater allocation. In 2011, 26 lowland streams were on full or partial restrictions for irrigation due to low flows and 10 groundwater zones were over-allocated or fully allocated (Miller, 2011, p.72). As well as concerns over freshwater allocation, an emerging concern in Canterbury has been the impact of dairying on freshwater quality. The environmental effects of dairy farming in traditional higher rainfall areas have centred on dairy effluent, sedimentation and phosphorous pollution caused by rainfall run-off (Wright, 2013, 2016). These issues are not so prominent on the Canterbury Plains with light free-draining soils and flat land. Rather the concern is with nitrate-nitrogen leaching.

Nitrate-nitrogen leaching describes a process whereby nitrates leach through the free-draining, shallow soils into groundwater affecting drinking water supplies and increasing nitrate toxicity in lowland streams where groundwater surfaces (Wright 2013, 2016; Scott, 2015). There are several potential sources of nitrate leaching from farming activities, but the single biggest source is cattle urine patches, particularly dairy cows (www.stats.govt.nz/ntriate-leaching-from-livestock). Soil type is a factor with free-draining soils estimated to leach at least twice as much nitrate-nitrogen as heavier soils (www.stats.govt.nz/ntriate-leaching-from-livestock) though, depending on soil type and irrigation, it can be substantially more (Scott, 2015). The total nitrate-nitrogen leaching in Canterbury from livestock (excluding fertiliser applications) is estimated to have increased from 15 000 tonnes per annum in 1990 to 33 000 tonnes per annum in 2017 using a conservative model (www.stats.govt.nz/ntriate-leaching-from-livestock). Therefore, while there are several environmental impacts associated with dairy farming, effects of nitrate-nitrogen leaching on water quality is the issue which has dominated conflict between farmers and environmental planning processes in Canterbury, and is the subject of this case study.

The response of the environmental planning process to the impacts of dairy farming on freshwater in Canterbury has occurred in three parallel phases. At a national level the Minister for the Environment established the Land and Water Forum in 2009, comprised of representatives from various organisations with interests in freshwater to advise on national policy (Miller, 2011). The Ministry for the Environment produced four national planning documents: National Environmental Standards for Water Metering and for Ecological Flows in 2010; and a National Policy Statement for Freshwater in 2011 revised in 2014 to include a National Objectives Framework for water quality (www.mfe.govt.nz). The National Policy Statements for Freshwater 2011 and 2014 direct regional councils on matters which must be included in regional plans to manage water quantity and quality (Ministry for the Environment, 2011, 2014).

Regionally, the Canterbury Mayoral Forum adopted the Canterbury Water Management Strategy (CWMS) in 2009 (Canterbury Mayoral Forum, 2009, p.71; Miller, 2011, p.72). Ten zone committees and a regional committee were established to address freshwater issues at catchment levels (Canterbury Mayoral Forum, 2009, p.11). Committees were comprised of people in local communities with an interest in freshwater, as well as iwi, district and regional council appointees. They were charged with developing consensus solutions to deliver the principles of the CWMS at catchment-level using a collaborative planning process to reach consensus solutions. The CWMS principles centre on managing water for all social, economic and environmental needs, though drinking water, iwi values, and in-stream environmental needs are 'first order' priorities (Canterbury Mayoral Forum, 2009, p.67). In parallel with the CWMS, Environment Canterbury continued the development of a regional planning framework under the RMA to manage freshwater, including the Canterbury Regional Land and Water Plan notified in 2012. That plan set a new default regional planning framework for freshwater with the idea that, as each zone committee developed their consensus solutions, amendments would be made to the regional plan to include catchment-specific rules (Canterbury Regional Council, 2012) provided they gave effect to the directions in the National Policy Statement for Freshwater, and the Canterbury Regional Land and Water Plan. Participants' spoke about their experiences with 'collaborative' planning processes for managing nitrate-nitrogen with zone committees that were used to feed into a freshwater planning process grounded in Rational Planning Theory and neo-liberalism, under the RMA.

While the nitrate-nitrogen issue in Canterbury is primarily associated with the dairy boom, all farmers are regulated for their nitrate-nitrogen losses under the Canterbury Land and Water Regional Plan (2012, 2016) and other relevant regional plans. The approach to managing nitrate-nitrogen loss in the environmental planning process in Canterbury is a three-step process. Firstly, farmers are required to estimate their nitrate-nitrogen losses using a model called OverseerFM. Secondly, farming activities are subject to either region-wide rules or catchment-specific rules that control the amount of nitrate-nitrogen leaching allowed. There are slightly different approaches in each catchment, but the general thrust is that each farm is given a nitrogen baseline calculated in OverseerFM and based on their farming activities at a specified point in time. Because nitrate-nitrogen leaching is primarily a function of soil type, rainfall and land use, in Canterbury nitrate-nitrogen loss estimates range from as little as 5kg/ha/yr for extensive dryland sheep farming or viticulture to over 120kg/ha/yr for some dairy farming systems (Scott, 2015; Hyde, 2017). Dairy farming and winter dairy grazing (dry herds) usually have significantly higher nitrogen baselines than other farming activities on the same soil types. Thirdly, farmers are required to prepare a Farm Management Plan that identifies potential effects of their farming activities on water quality and how these effects will be managed using good management practices (GMPs). The template for the farm plan varies both between catchments and depending on whether the farmer requires a resource consent (planning permission). However the farm plan template and the GMPs are set by the environmental regulator.

The rules for managing nitrate-nitrogen losses vary slightly between catchments, but generally farmers with low nitrogen baselines cannot increase their baseline or may only increase their baseline by a small amount (depending on the catchment) – this approach is dubbed 'Grandparenting Nitrogen' among farmers and primary sector organisations in Canterbury. Those with higher baselines may not increase their baseline and in some catchments are required to make percentage reductions in their baselines by

specified dates (Canterbury Regional Council 2012, 2016). In the Hurunui Waiau River Regional Plan (2013) all farmers could increase their nitrate-nitrogen losses by no more than 10% (Canterbury Regional Council, 2013). This meant a farmer with a nitrogen baseline of 5kg/ha/yr could increase to 5.5kg/ha/yr but a farmer with a baseline of 60kg/ha/yr could increase to 66kg/ha/yr. Environment Canterbury undertook a plan change in 2018 to amend these rules as they apply to dryland (non-irrigated) farming. The rules still apply to irrigated farming activities meaning that activities with very low nitrate-nitrogen losses such as viticulture have very limited scope to expand while some dairy farms can increase their nitrate-nitrogen losses by an additional 7 or 8 kgN/ha/yr.

7.3.2 Participants' Experiences of Freshwater Planning Process for Nitrate-Nitrogen

Participants' criticisms of the freshwater planning process for managing nitrate-nitrogen centre around two themes: the robustness of the information being relied upon in the environmental planning process; and the efficacy of the approach taken to address water quality issues associated with nitrate-nitrogen leaching. All participants agreed the issue needs to be addressed but suggested that planning process is not supported by the technical information required to make it robust. However there are different perspectives about how to manage the issue between the narratives, particularly between the dairy participants and those involved in other farming activities.

Figure 38: Participants' Comments on the Use of OverseerFM

F12L23	"It [Overseer] wasn't written for a regional council and therein lies its number one problem…it isn't a tool for regional councils to take as gospel…. It might be the best tool we have at the moment, but it is not the right tool."
F21L23	"I just think the rules…have come in before the science has caught up. That really annoys me about Overseer – all I want to see in my paddocks is clover …yet clover is seen as a dirty word in Overseer…it is the most healthy plant you can grow."
F27L43	"The whole system is flawed. It [Overseer] makes a lot of presumptions about N levels…really if you're going to test leaching you need to dig a hole a bit deeper to where the water is flowing and test that, not make assumptions…."
F24D23/1	"I found it frustrating that I'd get people who are supposed to be competent people giving me a range of 28 to 48 [kgN/ha/yr] for what I was supposed to be leaching when I was giving them the same information to put into it [Overseer]."
F35D12/1	"I think our average over the last 4 years was 64 [kgN/ha/yr] and then it went up to 100 and I thought jeepers…it [the number] is what it is and we can't change it…so we have to look at how we can adapt to it…."
F40A23	"We can generate a number [for N loss in Overseer]. What would you like the number to be…? I suspect if I sat down with my Overseer input data with two separate operators …we would get two quite separate results."
F43A23	"Overseer was developed on a Waikato pastoral base system one land use & four soil types …the [arable] rotations are too complex …to do an Overseer for dairy is about 7-8 hours but the average arable farm I think the figure is about 70 hours… So the cost of [compliance] is the wrong way round."
F49A23	"For a cropping farm it [Overseer] is useless... It's a guide only and I really think it should be used as that…how you manage your farm, how you manage your fertiliser, that is where the focus should be..."

Figure 38 (above) and Figure 39 (p.149) include examples of participants' perceptions of the freshwater planning process to manage nitrate-nitrogen leaching in Canterbury. Two topics are covered in the comments: perceptions about using the model OverseerFM; and opinions about the approach for

managing nitrate-nitrogen losses from farming activities. Figure 38 (p.146) contains quotes from the narratives about the use of OverseerFM as a tool to measure nitrate-nitrogen losses. There are two criticisms in the narratives: what OverseerFM measures and how it measures it. OverseerFM estimates the amount of nitrate-nitrogen leaching from the root zone of a farming system, but F06, F17, F18, F27, F43, F45 and F49 all pointed out that there is little 'scientific' information about the process of attenuation of nitrate-nitrogen as it moves from the root zone to water. F27 noted that OverseerFM takes no account of whether the substrate beneath soils is clay or gravel and therefore whether it impedes or facilitates leaching into groundwater, or the effects of denitrifying soils. F10, F22 and F49 said, "OverseerFM makes no distinction between 'good nitrogen' which is used in plant uptake such as legumes, and nitrogen leached into groundwater." F16, F27, and F38 all suggested a better approach would be to measure the actual nitrate concentrations in streams as they pass through a farm or installing lysimeters to measure nitrogen concentrations in groundwater.

Participants also criticised the accuracy of OverseerFM and its suitability for different farming activities. Criticisms include: that OverseerFM uses S-maps for soil type and official (NIWA) rainfall records and will not allow farmers to use more accurate on-farm soil and rainfall records; the ability to use the model in more complex farming systems such as arable farming; and the appropriateness of using OverseerFM as a regulatory tool because it has an accuracy rate of +/-30%. F50 observed, "if I got pulled over for speeding and the traffic officer told a judge his radar was accurate to +/- 30%, he would be laughed out of court." F15, F22, F28, F33, F40, F48 and F49 all commented that OverseerFM results can be manipulated once a person works out which inputs affect the nitrate-nitrogen loss estimates. F15 observed:

> "around here I can see farm land being converted to dairy and I'm thinking how the hell can they get away with that because it has been a cropping farm with a nutrient loss of 10-12 [kgN/ha/yr] and now it is going to be a dairy farm wintering on?"

Some participants told of having their nitrate loss estimates calculated by different consultants using the same data and the same version of OverseerFM but arriving at quite different nitrate-nitrogen loss estimates (F18, F24, F37, F40, F49). This uncertainty with the model is compounded by the regular release of updated versions of the model in which the participants' nitrate-nitrogen loss estimates change. These criticisms are consistent with the arguments raised in Chapters Four and Six around the depth of place-specific environmental knowledge held by the Canterbury-born participants, and their view that diachronic knowledge is more appropriate than synchronic knowledge because farming is place-specific not a generic activity.

The dairy participants focused on the changing nitrate-loss estimates in OverseerFM and the uncertainty that creates when trying to understand the environmental impacts of their farming systems. These narratives are consistent with the argument I made in Chapter Five that dairy environmental management systems focus on using 'end of pipe' technology to mitigate environmental impacts. The arable and drystock participants challenged what the model actually measures, and why arable and drystock farmers should have to use it when their nitrate loss estimates are comparatively low. This focus is consistent with the argument I made in Chapter Five of arable and drystock participants having environmental management systems that focus on matching land use with natural capital to minimise environmental

impacts rather than ‘end-of-pipe’ technology to mitigate them. The quote from F40 below reflects the perspective of arable participants about using OverseerFM:

> “Our Overseer data file is 148 pages long…we are running 12-15 crops in a year, 9 different soil types, 3 different types of irrigation and 3 different classes of livestock, in 2 water zones and 2 nutrient zones – the boundaries of which are not in the same place [under the Canterbury Land and Water Regional Plan]. How the hell do we ever fed that into an analytical programme and get a result that makes sense?...Maybe someone needs to say look are you actually trying to create a moratorium on land use change?...Is it a conversation about how we winter cows? I think it is…in a wet winter…you drive around the country and you see what condition some of the cows are in especially on fodder beet, and that’s where our losses are…And may be 4 or 5 cows/ha on light soils with an application of nitrogen after every grazing is what has caused this bloody problem?”

The participants who require resource consents for their nitrate-nitrogen losses describe the farm management plans as a ‘box-ticking’ exercise. F15 said that at the outset he found the exercise of documenting his farming and environmental management systems valuable, but he was not allowed by the environmental regulator to deviate from the farm environment plan template to suit his farming systems and knowledge. At that point he stopped doing it. Participants who do not require resource consents say they have not completed the farm management plans required for permitted activities under the regional plan rules.

Figure 39 (p.149) includes comments from the narratives about the planning approach for managing nitrate-nitrogen losses once nitrogen baselines are estimated using OverseerFM. The dairy participants were not critical of managing nitrate-nitrogen loss by restricting farmers to their current nitrogen baselines in principle, they were more concerned with the accuracy of OverseerFM in establishing what that baseline is. The non-dairy participants were critical of the concept of managing nitrate-nitrogen by restricting farmers to their current nitrogen baselines. These criticisms centred around both the fairness of the approach and its efficacy in addressing water quality issues. The non-dairy participants were also critical of the time it has taken the environmental planning process to address this issue. F38 said, “they needed to have done this 10 years ago” and F49 suggested, “the horse has already bolted.”

Limiting farmers’ nitrate-nitrogen leaching to their current nitrogen baselines creates different rules or levels for compliance for each farmer. In that sense it is a place-specific approach, but because nitrate-nitrogen loss is linked to land use and production intensity, those farmers who have the lowest nitrogen baselines are more restricted in future land use and farm development options than those with higher baselines. In Chapter Four, I argued that the primary goal of the participants is to remain in place and this goal underpins the participants’ views about rules restricting farmers’ future nitrate-nitrogen losses to current levels. Being limited to their current low nitrogen baselines is perceived by drystock and some arable participants as a threat to their ability to remain in place long-term, because they have few options to change or intensify land uses in response to changing markets. As noted in Chapter Five, all participants have collective familial or social memories of times when the family have changed what or

how they farm in response to long-term changes in commodity markets. Therefore they know retaining potential flexibility in land use is necessary to remain in place. As discussed in Section 7.1.3 the environmental planning process is a non-human assemblage. It is not embedded and does not have the same human agents involved in transactions over time. Therefore, it does not share the same collective memories as the participants about the need for land use flexibility.

Figure 39: Participants' Perspectives on Managing Nitrate-Nitrogen Leaching

F06L43	"There is an obligation to stand up against unfair law…these things must be treated as pollutants… I have no problem if you have a 3-figure N loss and you were given 12 months to sort it out or shut down."
F34H23	"…I would have put a circle around the hill and high country and said leave it at a level like 15 [kgN/ha/yr] or something, it's not going to change a lot. It's completely different on the Canterbury Plains, they've got so many issues."
F38H33	"We are not the problem and we are not the solution to someone else's problem...someone has to have the courage to say these things are unfair...We would be much better if we accept that some people [dairy] have to do some modification…"
F42H23	"I think sheep and beef farmers don't know what is going on…if they knew…. we would have tractors going to Wellington. Their property rights are being taken away without good reason…You need to have rules…however they need to be effects-based."
F18A33	"Those farmers doing 120 [kgN/ha/yr] are on marginal country that should never have been in dairy. They got the land for 'nix'…a 30% reduction [in N loss for dairy] is probably fair…"
F33A23	"I think grandparenting is totally wrong because it rewards the polluters and the conservative farmers get hammered…I think everyone should be given the same baseline - 30 to 40 [kgN/ha/yr] max... Why should we be given 16 or 18 and the dairy farmer neighbour 60 or 80?"
F43A23	"The biggest influencing factor on nutrient loss is soil type and a lot of the development went on land that was cheap because it was very light land [but]… it gets to the point where it's just too leaky … If you look back at this district all the dairying used to be on heavier ground and lower cow numbers…"
F11M43	"The simple answer is that we have to stop doing so much conversion…maybe it's saying [that] it is not okay to convert 1000s of acres of forestry to dairy on the north bank of the Waimakariri River… Nothing is ever going to compensate for a big [dairy] conversion…There are things we can do but the dairy cow urine patches are still a problem because we can't control that."
F20D22	"Grandparenting is wrong in that it says that's all you can do. Equal allocation of nutrient and [trading] all that says is let people pay to pollute. [Make] low water, and nutrient footprints a goal in farming... Just like if you are a top farmer you produce xkg of milk solids or x% lambing, to have a goal that you can do that with a nitrogen footprint of less than x…"
F23D23/1	"I don't think it [allocation] is helpful at all. I think we should be best practice … nutrient discharge allowances for trading does not sit comfortably with me…I'm confident there will be tools in the tool box at some stage…be it a supplement, fertiliser, DCDs again…."
F31D23	"I don't think we can be without some regulatory framework…but if we had to drop our stocking rates I would be very concerned because that is what drives our production and our grass quality which is all to do with the milk…"
F32D13/1	"…My preference would be to prevent further dairy conversions rather than allow future dairy conversions and then punish everyone who has a dairy farm...I would be quite pro a cow quota. One of the problems I think we have got ourselves into as an industry is following that model of unbridled growth…"

The non-dairy participants argued that managing nitrate-nitrogen leaching to current nitrogen baselines will not result in any improvements in water quality because there is no requirement or incentive for farmers with high nitrate-nitrogen leaching systems to reduce their environmental impacts. Rather, they suggest the approach incentivises farmers to have high nitrogen baselines so they can maintain some flexibility around land use options in the future. F33 spoke of using a particular consultant to calculate his

nitrogen baseline because, "…she will look after me and the farm will have some value" [by providing him with a higher nitrogen baseline calculation]. F39 noted that in the Canterbury Land and Water Regional Plan, nitrogen baseline calculations are derived from the land uses on farm during the period 2009-2013. That time period was the middle of the dairy grazing boom in their catchment so she argues farmers will have higher nitrate-nitrogen baselines during that period than their long-term average as cropping farms. Consequently, the rules may result in a deterioration of water quality in their catchment. This example shows the difference between the historically embedded contextual knowledge of the participants who have farmed long-term in place and the general, conceptualised knowledge of the environmental regulators.

Also, the non-dairy participants spoke of their confusion about why Environment Canterbury was adopting an approach to managing nitrate-nitrogen loss which is not 'effects-based'; that is, there does not appear to be a correlation between the amount of nitrate-nitrogen loss and the degree of regulatory compliance and environmental mitigation required. As a planner I have pondered this same issue. While there is no specific requirement in the RMA that rules must be 'effects-based' (RMA s68-70, s76), since its inception, the RMA has been promoted by successive governments as focussing on managing the effects of activities (Memon, 1993, Miller 2011). To that end, the duty in section 32 of the Act requires local authorities to be satisfied any rule is the most appropriate method to achieve the objectives of a plan. However, if one understands farming as a generic activity, then arguably the approach is effects-based: nitrate-nitrogen losses from farming are affecting water quality, therefore farming is regulated to manage those effects. However as argued in Chapters Five and Six, the participants view different forms of farming as entirely different activities. Therefore, they struggle to understand why the consent authority is regulating arable or drystock farming to deal with an issue associated with dairy farming in specific environments.

The participants perceive that neither their farming nor their local environmental knowledge are recognised or valued by agri-scientists, planners or decision-makers in the environmental planning process for managing freshwater. For example, F46 told of putting his name forward to be on his local Zone Committee and being told by a senior executive in the dairy industry to, "…leave it to the professionals." Both F06 and F07 spoke of attending a hearing on the rules for nitrate-nitrogen loss in their catchment and not being asked any questions by the Hearing Commissioners. F06 said, "I spent hours trying to work out a sensible rule for winter grazing, that would capture the grazing they need to control [for nitrate-nitrogen loss] and not what they don't…all they said was, 'a bit dry up your way?'" These narratives are consistent with the issue discussed in Chapters Two and Six, that the environmental planning process does not recognise farmers as having valid knowledge about environmental management on farm.

Despite their concerns about the approach to managing nitrate-nitrogen losses by restricting farmers to their nitrogen baselines, the drystock and arable participants indicated the rules would not influence how they farm. They are confident that the nitrate-nitrogen losses from their farming systems are low and they can defend that, if necessary. F03 said, "I may have a naïve sense of justice, but I find it hard to believe that a court would uphold something which is so patently ridiculous." I argue this position does not reflect

a preference for economic values over environmental ones, or that these farmers are 'environmental risk-takers' (Miller, 2011). Rather I suggest it reflects confidence among these participants in their farming knowledge and their environmental management systems. The dairy participants were more nervous about impacts of the freshwater planning process on their farming systems, even though they are starting with relatively higher nitrate-nitrogen baselines than arable and drystock farmers. They all said they expected that over time they will be required to reduce their nitrate-nitrogen losses and they are uncertain how they can achieve that. F24 said, "Different experts have different slants on what is a problem and what isn't… You end up tearing your hair out because you [don't] know…whether it is going to have a mammoth impact on your farm". F46 has decided to sell one dairy farm, "I know I have a problem with leaching on M [farm]. I can't manage that problem so I am going to solve it by giving it to someone else."

7.3.3 Managing Effects of Farming on Freshwater – The Participants' Approach

When I asked the participants how they would manage freshwater if they could 'hold the planner's pen', they all said that the issue needs to be addressed. No one suggested farming activities should be allowed to pollute freshwater because the economic benefits of farming outweigh the environmental effects, even when I reminded participants that is a legitimate view to express. However no participants supported the planning approach taken by Environment Canterbury to address effects of nitrate-nitrogen leaching on freshwater. Some dairy participants started by saying, "I wouldn't do it any differently" (F11, F24, F35. F36) but they went on to talk about their concerns with the current planning process and what they would do differently. To that end, saying, "I wouldn't do it any differently" may reflect their view that the issue needs managing, rather than an endorsement of the specifics of the current planning approach.

The examples in Figure 39 (p.149) include propositions from some participants about how they would manage effects of nitrate-nitrogen leaching on freshwater. The narratives vary between dairy participants and non-dairy participants, and that variation is consistent with the argument I made for different environmental management systems in Chapter Five. The arable and drystock participants suggest approaches that minimise the risk of high nitrate-nitrogen leaching in the first instance by either: setting levels of acceptable nitrate-nitrogen loss in each catchment (measured in kg/ha/yr); or identifying soils which are prone to nitrate-nitrogen loss and having regulations to prevent higher nitrate-nitrogen leaching activities on those soils. F37, F48 and F49 said the LUC Mapping System referred to in Chapter Five could be amended to add a layer identifying soil and sub-strata types which have the propensity for nitrate-nitrogen leaching to groundwater while others suggested using the 'Catchment Board Model' to help farmers better match land uses with soil types. As noted in Chapter One, the Catchment Board planning process was grounded in Transactive Planning Theory: scientists and farmers working together to produce farm-specific management plans that integrated farming and conservation on farm with a focus on soil erosion, grazing and freshwater management. These approaches are consistent with an environmental management system centred on minimising environmental impacts by matching 'land use with natural capital'. To that end, several participants pointed out that the Council's approach of using GMPs does not deal with matching land use with soil type per se; and that, from the participants' perspective, running four or five cows/hectare on a light, free-draining soil under irrigation is not 'good management practice.'

F46 advocated for tradable nitrogen allocations but the other dairy participants said they prefer a planning approach that focuses on GMPs to mitigate nitrate-nitrogen leaching rather than some form of nitrate-nitrogen allocation. F23 said she has confidence at some stage there will be, "…tools in the tool box to deal with nitrate-nitrogen losses." Most dairy participants said they would be concerned with a planning approach that affected their cow stocking rates or milk production. These comments are consistent with my argument that dairy farmers prefer environmental management systems that focus on the use of agri-science technology to mitigate environmental impacts, and with Jay's (2006, undated), Blackett and Le Heron's (2008)) observations that the dairy industry advocates for environmental management techniques which do not impact on production. F11, F14, F24 and F32 said they would support a moratorium on new dairy conversions or a cap on the number of dairy cows in a catchment. The reason they gave is that they believe environmental mitigation measures adopted by existing dairy farmers will be 'cancelled out' by further dairy conversions. To the best of my knowledge, the concept of limiting dairy cows numbers has not been raised by Dairy NZ or any milk companies participating in environmental planning processes for freshwater in Canterbury (though it has been raised by environmental advocates). F32 explains this silence:

> "One of the problems I think we have got ourselves into as an industry is following that model of unbridled growth…if you follow the graphs the profitability for the individual farmer has not grown as Fonterra has grown…Those organisations [Fonterra and Dairy NZ] tend to dictate that discussion...I think if farmers actually sat down and thought about what this means for me individually then I think they would probably push for something quite different."

F32's comment reinforces my argument from Chapter One, that consulting with agri-scientists, grower levy bodies or milk and meat companies in environmental planning processes is not akin to consulting with farmers; they all have different knowledges and perspectives.

Irrespective of their preferred approach to managing nitrate-nitrogen losses, all participants said that regulation through the environmental planning process is likely to become secondary to the requirement to demonstrate good environmental and animal welfare practices as part of supply contracts for farm products. Several participants said they are already subject to multiple auditing processes for companies they supply and for irrigation companies if they are supplied water from an irrigation scheme. To that end, they all said one accreditation programme that meets the requirements of both supply companies and environmental regulators is preferable to having multiple sets of regulations and compliance audits. However, they also said that: such a programme must be developed by farmers or those with a good knowledge of farming systems to ensure the programmes are compatible with farming practices; and the programme should focus on principles or outcomes, with the methods to achieve those outcomes specific to each farm. This approach is consistent with the arguments made in Chapter Five about participants understanding farming as place-specific and farmers as having expert knowledge of farming place.

There was also discussion as to whether farm accreditation programmes should focus on requiring Good Management Practice or Best Management Practice: some participants suggested farmers should strive for 'best' while others argue that 'best' implies you cannot get any better and there is always room for improvement. Either way, what is pertinent for this research is the existence of a cohort of farmers who are both knowledgeable about and motivated to address environmental issues associated with farming.

They are not debating whether economic or environmental values are more important, but which planning approaches are likely to get the best environmental outcomes. This behaviour among the participants is consistent with the way they have described place and farming in Chapters Four and Five. Also, it is consistent with the Biological Economies Team's research. The production systems explored in that research were not based on a new way of farming, but rather a new way of promoting and marketing farm produce that recognises, values and tells the farming story. This case study leaves me pondering why the environmental knowledge and ethics of non-indigenous intergenerational family farmers and the concept of values-based primary production, are not recognised and harnessed within environmental planning processes?

7.4 Conclusions and Reflections

Both case studies analysed in this chapter describe conflict between participants and the environmental planning process in Canterbury: one in relation to the protection of conservation sites on farm; and the other in managing effects of farming activities on freshwater. In neither case study is this conflict described as a simple 'economic versus environment' proposition. No participants posited that environmental issues ought not to be addressed because the economic benefits of farming outweigh the environmental effects. That is not to suggest that economic values are not a factor in these conflicts, particularly in the case study of managing effects of nitrate-nitrogen leaching on freshwater quality, nor is it to suggest that there are not farmers in Canterbury for whom conflict with environmental planning processes is a simple 'economic versus environment' proposition. However, both case studies illustrate complex and variable understandings of environmental issues among the participants, understandings which accord with the participants local environmental knowledge from longevity in place, and their farming and associated environmental management systems.

In the case study on SNAs and ONLs, all participants said sites should not be listed in district plans without the landholder's agreement and all cited the same reason, the importance they assign to private property rights. Yet none of the participants with SNAs or ONLs on their farms said they wanted to develop up those areas, rather they were actively managing them for their conservation values. The case study showed that conflict between the participants and the environmental planning process over protecting SNAs and ONLs is not an 'economic versus environment proposition' but conflict between alternative environmental management systems based on different ways of knowing. The participants regard conservation sites as an integral part of the family farm and in extensive dryland pastoral farming wild ecosystems are an integral part of the farming system. Identifying SNAs and ONLs in district plans with accompanying rules, removes those sites physically and psychologically from the farming system and from the custodianship of the family farmer. This reasoning is consistent with the preference of the participants for using covenants with QEII Trust or similar mechanisms to legally protect conservation sites on farm; those mechanisms recognise and respect the custodianship of the landholder. The participants did make comments about the impracticality and cost of obtaining resource consents (planning permission) to undertake activities in SNAs and ONLs, but this was an adjunct to the main arguments for opposing listing SNAs in district plans.

In Case Study Two, conflicts between participants and the environmental planning process were more nuanced. There were shared positions among all participants as well as differing views between arable and drystock participants and dairy participants. As with Case Study One, all participants agreed that the effects of nitrate-nitrogen loss on freshwater need to be managed; no participant said that the economic benefits outweigh the environmental effects. Unlike Case Study One, all participants agreed rules were necessary, which I argue reflects their recognition that freshwater is not private property. All participants agreed the use of OverseerFM in a regulatory environment is inappropriate in its current form, which reflects the shared understanding among all participants that farming is place-specific and that accurate, place-specific knowledge is the most appropriate form of knowledge for farming.

In discussing how to manage nitrate-nitrogen losses, two different approaches were advocated. Dairy participants preferred the use of agri-science technology to mitigate nitrate-nitrogen losses, while arable and drystock participants preferred management approaches that minimise the risk of nitrate-nitrogen leaching by matching land use to soil types in the first instance. This difference in approach is consistent with the argument in Chapter Five that dairy farmers have different environmental management systems from arable and drystock farmers. It is also consistent with the notion that participants object to environmental regulation which they perceive as threatening their ability to remain in place. Drystock and arable participants object to being capped to low nitrate-nitrogen baselines because it limits their ability to change or intensify land uses if commodity markets change. Dairy participants object to having to reduce their nitrate-nitrogen losses because they are uncertain whether that may impact on milk production. This dairy narratives are consistent with Jay's (2006, undated), Blackett and Le Heron's (2008) and Le Heron's (2018) arguments that dairy farmers adopt environment mitigation that does not impact on production. To that end, the issue is an 'economic versus environment' proposition but not one of opposing any environmental management because it reduces potential production or profit. Rather, it is opposing particular environmental management approaches that are perceived as compromising the ability to remain in place. I believe this is an important distinction because it suggests the participants are willing to address environmental impacts of farming activities on freshwater, it is the methods which are contested.

In both case studies, participants have worked successfully with planning processes that are grounded in Transactive Planning Theory, and many of the issues participants identified in the case studies as sources of conflict or dissatisfaction with environmental planning processes were similar to those identified in the literature on Transactive Planning Theory. Unsurprisingly, the planning processes the participants' suggested they would use if they could 'hold the planner's pen' fit a model based on Transactive Planning Theory. As noted in Chapter Two, for Transactive Planning Theory to work, actors and assemblages have to be capable of recognising and validating different ways of knowing, and the different ways of knowing have to be reconcilable as planning outcomes.

As noted in Chapter Five, there are different ways of knowing farming and environmental management in Canterbury some of which are epistemologically more closely aligned with current environmental planning processes than others. To that end, drystock and arable participants do not understand why they are being regulated to manage the effects of an issue associated with dairy farming. However, the

environmental regulator has an understanding of farming as one generic activity, albeit with different crops or livestock. In that context, they identify the issue of nitrate-nitrogen leaching as a 'farming' issue rather than a 'dairy farming' issue. Secondly, as noted in Chapter Six, different forms of farming require different knowledge and skillsets, and dairy farmers are perceived by other farmers as having less knowledge and skills in soil, fertiliser and irrigation management. Yet in freshwater environmental planning processes dairy farmers are perceived as more progressive in environmental management than other farmers because the environmental management systems used by dairy farmers are more aligned with environmental planning processes than the systems used by arable and drystock farmers.

On face value, these different ways of knowing are not insurmountable in Transactive Planning Theory. They become insurmountable if the assemblage is unable to recognise and validate different ways of knowing and doing farming or environmental planning: if actors are not open to mutual learning. In relation to freshwater planning in Canterbury, Duncan (2016) concludes this is the case. In Section 7.3.3, I questioned why environmental planning processes appear blind to the environmental knowledge, practices and ethics of non-indigenous intergenerational family farmers. Yet, at the same time, that same story is being told with increasing economic success in value-based primary production (Le Heron et al 2016; Pawson et al, 2018). In Chapter Two, I questioned whether the environmental planning process in New Zealand is forgetting its ideological foundations and no longer capable of recognising environmental management systems underpinned by different ways of knowing; in short can it only 'do planning' one way? If this is so, the key to resolving conflict between participants and environmental planning processes may not hinge on participants engaging more in environmental planning processes or greater co-production of knowledge. It may require a rethink of how planning is done. This concept is explored in Chapter Eight.

CHAPTER EIGHT Intergenerational Family Farming as Environmental Management

The places in which resource management systems are embedded are objects of contested interpretation and use. They are cultured places. They are places of the heart."
(Howitt, 2001, p.173)

8.1 Introduction

Chapter One tells the story of the origins of this thesis and how my research questions emerged. This chapter attempts to answer those questions drawing on the interpretations and analyses of the narratives in Chapters Four to Seven:

- It articulates the nature of the participants farming culture;
- It establishes whether conflict between the participants and environmental planning processes is an 'economic versus environment' proposition of tension between different ways of knowing; and
- It investigates whether and how different ways of knowing environmental management can be recognised and reconciled in environmental planning processes.

Howitt (2001), cited above, describes resource management systems as embedded, and the places where they are embedded as 'cultured places' or 'places of the heart'. This chapter explains that among the participants there are shared understandings of both the family farm as a cultured place and a place of the heart; and farming as the means of knowing and interacting with that cultured place. Section 8.2 identifies and articulates a non-indigenous intergenerational family farming culture among the participants. Expanding on the indicators for different ways of knowing outlined in Figure 4 (p.30), I argue that the participants' farming culture and associated environmental management systems are underpinned by understandings of farmer-farm relationships, farming systems and farming knowledge that are contextual, experiential and embedded. To that end, I argue it is a farming culture and knowledge system that differs in subtle yet fundamental ways from the understandings of farming and knowledge that underpin Western agri-science and planning paradigms. At the same time, it has characteristics found in TEK and Western science knowledge systems; it is a blended epistemology. On the other hand, it is not uniform. There are differences between the participants' farming systems and knowledges. To that end, this research does not argue for one universalising, alternative way of knowing and doing farming from Western agri-science. Rather, it makes a case for the existence of multiple farming knowledges and associated environmental management systems in Canterbury.

This research has uncovered and articulated a farming culture which is not recognised in literature on agri-science or environmental planning processes in New Zealand. However it is recognised in the writings of non-indigenous intergenerational family farmers in Canterbury over the last 150 years, and to varying degrees in social science research that focuses on farming as a relationship between people and place. While this thesis has focused on the participants' farming culture, I argue the sample of narratives analysed is sufficiently large and geographically diverse, and the cultural characteristics sufficiently uniform, to argue for the existence of a non-indigenous intergenerational family farming culture based on

place-attachment, beyond the participants. This raises a question: why is this culture, and the environmental management system it embodies, not recognised in environmental planning processes? Section 8.3 addresses this question. In particular it examines the extent to which divergent ways of knowing can be addressed through integration and co-production of knowledge or whether more fundamental, arguably ontological, differences act as barriers to recognising and reconciling different ways of knowing?

Section 8.4 attempts to answer Duncan's (2016) question cited in Chapter One. It employs a Foucauldian-inspired Discourse Analysis to identify the overt and covert power structures and relationships which influence the interaction between the participants and environmental planning processes. The purpose of this analysis is to identify the extent to which environmental planning processes need to be unravelled and reconfigured to enable it to recognise and respond to alternative environmental management systems underpinned by different ways of knowing. To that end, Section 8.4 argues for both a return to critical policy analysis in New Zealand, and the introduction of a place-attachment environmental planning model.

8.2 Non-Indigenous Intergenerational Family Farming as Cultural Knowledge

Throughout this research I have described shared understandings of the farmer-farm relationship and ways of knowing farming among the participants, and in Section 8.1 above I described the family farm as a cultured place and the participants' family farming systems as cultural knowledge. The study of culture sits within social science disciplines such as sociology, anthropology and cultural geography. It is subject to theoretical debate over what constitutes culture; whether it is a separate entity from and external to individuals in society and whether it is created by consensus. Durkheim (1895 in Smelser, 1992, p.9) defines culture as a collective conscience among a group of individuals which leads to a form of cultural coherence that is expressed in both social structure and relations among collectives. Smelser (1992, p.10) defines culture as, "repeated patterns of beliefs, customs, values and rituals that seem to persist over time." I have relied on both definitions to describe the shared understandings of farmer-farm and farmer-farming relationships described in the narratives as a non-indigenous intergenerational family farming culture: a set of beliefs, customs, values and rituals that is shared among participants, persists over time, and is sufficiently coherent that it is expressed in social structures and relations.

To articulate that culture and associated environmental management systems, I have borrowed from TEK literature indicators of key characteristics of TEK and Western science knowledge systems. These characteristics are depicted in Figure 4 (p.30) as indicators or signposts of different ways of knowing farming. Figure 40 (pp160-161) employs and expands on Figure 4 (p.30) to illustrate the extent to which the participants' farming culture is a different way of knowing farming from agri-science and environmental planning processes in New Zealand, and the core components of difference. As outlined in Chapters One and Two, this thesis is not making an argument that the participants' farming culture is akin to indigenous TEK. However, TEK literature provides an established framework conceptually and methodologically for assessing and articulating environmental management systems as cultural knowledge.

The fundamental characteristics of the participants' farming culture is place-attachment. As noted in Chapter Four, the participants distinguish between intergenerational family farming which they understand is centred on a long-term attachment to place, and other farming models such as 'corporate farming' and 'farm developers'. While all the participants are non-indigenous intergenerational family farmers, their narratives reveal both similarities and differences in their farming knowledge and practices depending on their farming background, longevity in place, farming sector (dairy, arable or drystock), and fiscal circumstances. However, none of the narratives were narratives about a generic activity called 'farming', or an understanding of farming as simply the commodity production of food and fibre. Irrespective of the timeframe within which the narratives were told or written, and irrespective of the farming background of the narrator, all the narratives tell of farming as a physical, cognitive and emotional relationship between people and place.

The narratives describe the family farm as home and, depending on how long the family has been in place, identity. Both the family farm and nature are understood to be independent entities, which are characterised, personified and in the case of nature, feminised. The relationship between farmer, farm and nature is based on respect and reciprocity. In Chapter Four, I argued that the notion of the family farm as being in nature and participants having a respectful and reciprocal relationship with nature is reconcilable with the history of environmental impacts of farming in Canterbury. The participants discuss how the importance of retaining wild ecosystems on farm has changed over time as wild ecosystems have become rarer and knowledge of the value of indigenous biodiversity has grown. Others tell of always having valued wild ecosystems, which is why they remain on farm. A characteristic of TEK knowledge systems recognised in the literature is kincentric relationships with the environment, for some cultures an ontological singularity – they are the land (MacGregor, 2004). Yet despite that relationship, TEK systems are not environmentally benign (Howitt, 2001; Berkes, 2012; Whyte, 2013; O'Regan, 2014; Dahl, 2015). Rather they are adaptive, able to recognise when farming systems are having adverse environmental effects, and to adapt those farming systems to ensure longevity in place. As noted in Chapter Four, the narratives do not suggest a relationship between participants and place that is ontologically kincentric, though Turner (1983) argues for evidence in the writings of high country farmers of a kinship with land. However, I argue it is a subject-subject relationship, rather than a subject-object relationship, and it is emotive: the family farm means more to the participants than a medium to support a generic activity called farming.

Chapter Five interprets and analyses the participants' understanding of farming as a complex interaction of economic activity, in-situ environmental management, vocation, and familial and community interaction. While there is a core economic aspect to farming, the motivators are to produce good quality products and, through that action, generate sufficient income to remain in place. It is not farming to maximise income or production to the exclusion of other values. To that end, I argue, the understanding of farming described in the narratives differs from that which underpins agri-science and environmental planning processes. Menzies and Butler (2006, pp9-10) refer to TEK as local, holistic, embedded in cultural context, with moral and spiritual elements. I argue the participants' farming culture is also local, historic, embedded in cultural context, with moral and for some spiritual elements. Whether the farming culture articulated in this research is sufficiently aligned with TEK systems to be named TEK, draws the research into debate about how TEK is defined. In particular, it invites debate over whether TEK is specific

to indigenous cultures, and whether one accepts a conceptual understanding of TEK knowable beyond cultural context and therefore enabling others to ascertain whether a group's cultural knowledge is TEK. As discussed in Chapter Two, those debates are secondary to this research: the key point is that the narratives reveal a farming culture which is grounded in an understanding of farming as a relationship between people and place, that gives rise to farming knowledges and practices that are embedded. To that end, it is a different way of knowing farming from that underpinning environmental planning processes grounded in Western agri-science; the latter focusses on farming as a technical activity of commodity production, grounded in knowledge and practices which are conceptual, fixed and universalising.

I have described the participants' farming culture as a blended epistemology, sharing characteristics of TEK and Western science knowledge systems. This result is not surprising given that in Chapter Six all participants tell of acquiring their farming knowledge from both diachronic and synchronic sources: growing up on the family farm and formal secondary and tertiary education. For example, in Chapter Four I noted over 40 descriptors of 'country' used by the participants in this research, each with its own meaning linked to the suitability of land for pastoralism. These descriptors are not found in formal science literature; it is 'farm talk.' However when it comes to soil types, the participants use both farming descriptors and soil science classifications to describe their soils on farm. Dahl (2015) argues that TEK can be lost as indigenous communities become educated in Western science. However the participants do not describe their traditional farming knowledge as being substituted by Western agri-science. Rather, both knowledge sources are used in farming systems. However, farming is understood by all participants as place-specific and, as such, diachronic knowledge is regarded as more appropriate than synchronic knowledge for farming place. Berkes (2018) suggests some indigenous communities mistrust Western science. The participants do not tell of mistrusting Western science, rather they are aware of its more generalised and theoretical nature. Therefore before using it, they filter it with their own place-specific farming knowledge to evaluate and decide on its applicability to or suitability for their family farm and farming system.

Menzies and Butler (2006) describe TEK as an alternative resource management system underpinned by different ways of knowing. Similarly, I argue the participants' farming culture is an alternative environmental management system underpinned by different ways of knowing. These findings have two implications for environmental planning. Firstly, an environmental planning process that assumes and is oriented to respond to a single, conceptual understanding of farming, in this case as the commodity production of food or fibre, may be incompatible with lived farming knowledges and practices. Secondly, the farming culture described in this research is intergenerationally focused and held by farmers who are both interested in and bound to maintain and enhance both the productive and conservation values of place. As such, it provides potentially more effective ways to manage some environmental issues associated with farming than those used in contemporary environmental planning processes.

Figure 40: Ways of Knowing: Agri-science & Participants' Farming Culture

Indicator	Agri- Science	Non-indigenous Intergenerational Family Farming
Human-Environment Relationship	• Subject-object dichotomy • Utilitarian – land is a medium to undertake activities • People own land	• Subject-subject partnership of co-dependence & reciprocity: farmers use & 'give back' to the land. • Place-attachment & emotive • People belong to place • Property rights give legal recognition to the place relationship.
Nature	• Collection of natural resources & ecosystems • Operate to universal laws of behaviour • Nature can be manipulated with science & technology to improve farm production	• Entity with her own wills & ways • Relationship of respect & reciprocity • Technology can assist in farming but must farm with not against nature or 'she will bite you in the bum.'
Farming	• Commodity production of food & fibre • Economic activity contributes to national economy • Focus on maximising production • Environmental impacts need to be addressed in response to social pressure • Farming is a technical activity that can be learned conceptually & applied to place	• Way of life: vocation, earning of income to remain in place, social necessity - feeding people, familial & communal. • Focus is on remaining in place & producing high quality products because farming is a vocation • Environmental impacts need to be addressed as part of ethical obligations to place, livestock, family & community • Farming is cultural knowledge, embedded in place: it is economic activity, in-situ environmental management, family & community.

Indicator	Agri- Science	Non-indigenous Intergenerational Family Farming
Knowledge	• Conceptual, theoretical-based & universalising • Diachronic knowledge is valued for proving/disproving theoretical knowledge • Organised in specialist disciplines dealing with an area of plant or animal production • Expert is person with formal academic qualifications in a specialist area	• Contextual, varied, & place-specific • Diachronic & synchronic sources are used & valued but diachronic is more appropriate to farming place • Information is taken from a variety of disciplines but applied to the farm as an entire system in place • Farmers are experts in farming their farm • Agri-scientists are experts in their specialist areas but knowledge must be applied to place • Handed-down knowledge is also valued but must be applied to today's context.
Learning	• Relates to specialist topics • Theoretical learning is highly valued • Information is transferred from expert to expert formally through writing & peer review • Information may be transferred from expert to farmer through publications or field days/demonstrations • Experiential learning is valued but from the perspective of identifying universal laws of causal behaviour that can be applied to other farms	• Relates to whole systems in place • Experiential learning is highly valued • Farmers learn most from other farmers who they identify as mentors. • Information may be acquired formally in field days/demonstrations or farm discussion groups or informally as part of community interaction • Information may be gained orally, practically or from literature, but in all cases is assessed by the farmer for its applicability to place.

8.3 Conflict Between Non-Indigenous Intergenerational Family Farming Culture and Environmental Planning Processes

To reconcile conflict in environmental planning processes and maximise the potential to utilise the knowledge of non-indigenous intergenerational family farmers in managing environmental issues associated with farming, non-indigenous intergenerational family farming culture needs to be recognised and validated in environmental planning processes. As noted in Chapter Two, there is a gap within planning literature on reconciling conflict between planners and people-in-place who have different ways of knowing. Both Transactive Planning Theory and Communicative Planning Theory recognise different ways of knowing but they assume two things: firstly that actors and assemblages in planning processes understand social-constructionist realities and are willing and able to recognise and value different ways of knowing; and secondly, that different ways of knowing are reconcilable in planning outcomes. Within Indigenous Planning and TEK literature there is more debate about whether and how alternative environmental management systems can be merged with Western science and planning paradigms. In Chapter Two I noted that Berkes (2012, 2018) and Whyte (2013) identify three understandings of TEK in academic literature: those scholars who understand TEK as an historic or archival body of knowledge that is transferable; those who regard TEK as cultural knowledge which must be understood within its ontological context; and those who regard TEK as being. Consequently, some researchers in decolonisng research frameworks argue for integration of Western and indigenous planning systems and co-production of knowledge, while others argue for the disestablishment of colonial planning and legal frameworks in favour of indigenous planning systems for indigenous people (for example, Matunga, 2000; Porter, 2004). Whether they advocate for integration or separation of planning systems as the way forward, most contemporary researchers in Indigenous Planning or TEK caution against using TEK out of context, "…of seeking to incorporate it into a system of problem definition and policy response created by scientific or policy advisors" (Whyte, 2013, p.67).

Indigenous Planning Theory and TEK literature delves deeper into underlying assumptions about human-environment relationships and ways of knowing than conventional planning theory and critical policy analysis, and contemplates the existence of ways of knowing which are incompatible. However, it, too, leaves a question of practical importance to planning: how? How do you reconfigure colonial planning frameworks with indigenous planning systems and how does that system integrate or co-exist with other ways of knowing? In Section 8.2, I argued that the participants' farming culture is a blended epistemology. Does that blended epistemology make it easier to incorporate into an environmental planning process which is grounded in Western science; or does it make it harder because the similarities between ways of knowing mask subtle but significant differences? In the case studies in Chapter Seven, participants described their experiences with and perceptions of environmental planning processes for managing conservation sites on farm and effects of nitrate-nitrogen leaching on freshwater. The participants described how they would manage those environmental issues if they could 'hold the planner's pen'. In both case studies, the participants criticised how the issue was being managed, not the need to address the issue per se. These findings are consistent with Transactive Planning Theory (Freidmann, 1973, 2008; Friedmann & Huxley, 1985; Carroll & Hendrix, 1992). In addition, the reasons why the participants criticised the planning process appear to have some merit. Figure 41 (p.163) summarises key differences

between the environmental planning process used in Case Study One (protecting conservation sites (SNAs) on farm) and the participants' preferred planning process. At face value these differences appear reconcilable if planners and ecologists involve farmers in the decision-making for protecting SNAs, use the farmers' preferred methods for protecting sites such as covenants, undertake site visits, and develop site-specific management plans in consultation with farmers. So why does this conflict persist? Why doesn't the environmental planning process hear and respond to this much less adversarial and arguably more effective way of managing SNAs?

Figure 41: Comparison of Planning Processes for Managing SNAs (Case Study 1)

I was discussing this issue with a planning colleague and he replied, "but we do [listen and respond], in the Zone Committees." As discussed in Case Study Two in Chapter Seven, Zone Committees were established as part of a freshwater planning process in the Canterbury Water Management Strategy, and use collaborative planning processes to try and develop consensus solutions to managing freshwater issues in particular catchments. However the process occurs within a statutory planning framework (the RMA) which is underpinned by Rational and Neo-liberalist Planning Theories. My colleague's response highlighted for me a potential difficulty with focusing on planning methods or practices to affect change in planning processes, without addressing the ideological foundations which underpin them. For example, in Chapter Seven I described how some local authorities require farm environment plans as a tool to manage effects of farming activities on biodiversity or freshwater. On the face of it, that tool appears consistent with the participants' preference for site-specific management plans shown in Figure 41 above. However those farm environment plans follow a generic template created by the local authority (environmental regulator) and are required as part of complying with generic rules, rather than as an alternative to those rules. These farm environment plans are underpinned by assumptions that: farming

and environmental management are separate activities on farm; the environmental regulator holds both knowledge and responsibility to address environmental issues on farm; and that environmental management on farm is most effectively discharged within a regulatory framework. In this context, farm environment plans are tools to ensure farming activities comply with rules created within environmental planning processes, rather than a tool to articulate farmers' place-specific environmental management systems.

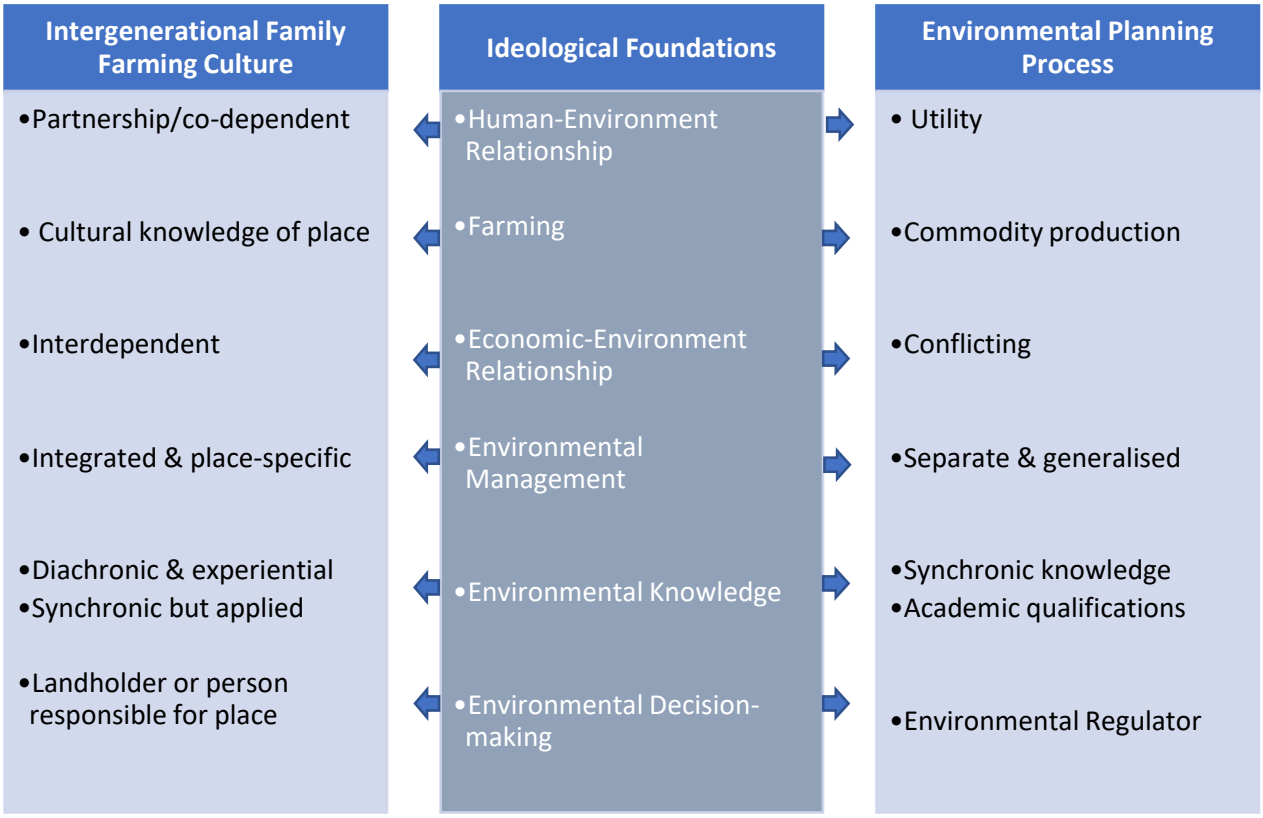
There are other examples in Canterbury, and elsewhere in New Zealand, of tools and approaches which attempt to 'bridge the gap' between environmental planning processes and alternative environmental management systems, by focusing on epistemological integration and co-production of knowledge. For example, Tipa and Nelson (2008) developed a Cultural Opportunities Mapping and Assessment Tool (COMA) to enable Ngāi Tahu whānui to convey the principles underpinning their relationship with the natural environment in ways which can be recognised and incorporated into environmental planning processes under the RMA. COMA uses mental maps to enable Ngāi Tahu whānui to identify issues and opportunities for freshwater management within their takiwā (areas of customary authority) using matauranga and tikanga (traditional knowledge and practices). Unlike the Farm Environment Plan example above, COMA is designed by Ngāi Tahu whānui, so it reflects their understanding of place and ways of knowing. COMA assessments have been commissioned by Environment Canterbury as part of planning for freshwater in Canterbury. However the regulatory framework for managing freshwater is grounded in Western hydrological science and planning paradigms: abstraction of water is controlled by setting minimum flows and allocating volumes of water into 'blocks' for abstraction above those minimum flows (Canterbury Regional Council 2012, 2013, 2016). To that end, Environment Canterbury staffers wanted to know what COMA assessments 'translate' to as a minimum flow for each river (Tipa, pers. comm).

In another example, in the planning process to develop the Replacement Christchurch District Plan following the Christchurch Earthquake in 2011, Christchurch City Council and Te Rūnanga o Ngāi Tahu collaborated on the development of a new papakāinga/kāinga nohoanga zone for tribal land on Banks Peninsula/Te Pātaka o Rakaihautu (Murchison, 2017). The planning framework was based on the principle of nga rūnanga determining their own land development in accordance with tikanga Tahu (Ngāi Tahu customary practices) rather than using conventional land use planning rules (Ibid, p.6). However, through the planning process, both the Christchurch City Council planners and neighbouring landholders sought the introduction of conventional planning rules so the Council could ensure any development of land within the papakāinga/kāinga nohoanga zones was 'appropriate' within a Western planning paradigm (Ferguson, 2017; Murchison, 2017). These examples reinforce to me that integration and co-production of knowledge may have limited value as a means to recognise alternative environmental management systems based on different ways of knowing.

In Chapter One, I quoted Howitt's (2001) proposition that conflict in resource management systems can reflect much deeper ontological schisms or different worldviews. It is debatable whether the participants' worldviews differ from those underpinning Western science and planning paradigms to the extent which may be found among indigenous cultures. However, it does raise a question whether changes in planning

methods or practice can affect different outcomes if they are divorced from changes in underlying planning ideology? In Chapter One, I outlined the development of the contemporary environmental planning process in New Zealand which resulted in a planning framework grounded in Modernist or Rational Planning Theory and Neo-liberal Planning Theory (Memon & Gleeson, 1995; Perkins & Thorn, 2001). Modernist or Rational Planning Theory is underpinned by understandings of the human-environment relationship and valid forms of knowledge that align with Western science (Sandercock, 2004; Bromley, 2001). This framework is blended with neo-liberalist concepts of economic and environmental objectives as conflicting, a retreat from state intervention in economic activity, and the desire to separate policy, regulatory and implementation functions in government.

Figure 42: Comparison of Environmental Management Systems



Throughout this research I have described the participants' understandings of human-environment relationships, economic-environment relationships and valid forms of knowledge. These differences and how they manifest in environmental management systems are summarised in Figure 42 above. In the environmental planning process, issues tend to be understood as a competition between economic and environmental values or as Howitt (2001, p.59) describes it, "…competing values of country as utility." Because these values compete, contemporary environmental planning processes manage environmental issues by separating land into 'production land' which is assumed as best managed by the landowner to maximise its productive values, and 'protected land' which is set aside from any use or development through legislation which is enforced by an environmental regulator. In New Zealand, that regulator is either central or local government. Farming is assumed to be an economic activity and therefore farmers

are assumed to focus on using their land to maximise commodity production (Jay, 2005; Miller, 2017). Within this context, it becomes clear why environmental planning processes struggle with a notion that farmers may be motivated to maintain conservation values on farm without any regulatory requirement or fiscal incentive, or that areas on farm can be co-managed for both production and conservation values.

The environmental planning process understands the environment as a collection of natural resources, and knowledge as held by those with academic qualifications in a relevant discipline. Therefore, the environmental planning process is, to use Le Heron's (2018, p.181) description, 'single-issue' focused and relies on generic rules or regulations to manage the effects of prescribed activities on specific resources. The use of place-specific environmental management systems ensconced in cultural knowledge fundamentally challenges this system. It requires environmental managers or decision-makers to possess in-depth, detailed knowledge of place and farming place, so it shifts the expertise in environmental management from environmental regulator to farmer. However, the environmental planning process assumes farmers have neither the expertise nor the motivation to address environmental issues, so it cannot satisfy itself that environmental issues will be appropriately managed by farmers without regulatory oversight and coercion. F48's and F49's experiences with soil moisture probes discussed in Chapter Six, are examples of this challenge. To understand soil moisture budgets requires a planner to have in-depth understanding of agronomy or to trust that the farmer has that in-depth understanding; whereas the requirement to install a soil moisture probe simply requires a manual check that the probe is in place. Removing the responsibility for environmental management from resource user to regulator results in the 'dumbing down' of environmental management to generic, simplified measures and behaviours, compliance with which can be checked by staffers with no specialist farming knowledge. To engender success, the planning process assumes that farmers will be aware of and comply with those regulations. However, the process of farm decision-making described in Chapter Six and the case studies in Chapter Seven suggest this is not the case. The participants did not identify compliance with environmental regulations as one of the main factors they consider in decision-making on farm unless the farmers, themselves, perceive the regulation is appropriate.

In answer to my second research question, I argue that the degree to which conflict between non-indigenous intergenerational family farmers and environmental planning processes can be resolved, relies on undoing and reconfiguring the ideological foundations of contemporary environmental planning processes in New Zealand. Focusing on methods or practices alone achieves what Menzies and Butler (2006) and Whyte (2013) caution against, "…decontextualizing cultural knowledge and incorporating it into a system of problem definition and policy response created by scientific or policy advisors." Agrawal (2004) argues that every society has some form of knowledge system, all of which are guided by the challenges people face. The challenge, in this situation, is conveying the concept of different and equally valid ways of knowing to assemblages in environmental planning processes in New Zealand; assemblages which are comprised of actors who are well-educated in understanding 'scientific' knowledge as objective and therefore superior to other ways of knowing. To that end, I argue that reconciling non-indigenous intergenerational family farming culture with environmental planning processes requires more than articulating and legitimising non-indigenous intergenerational family farming culture using approved academic research protocols. It requires more than translating that culture into words environmental planning processes can 'hear'. It requires more than fostering an awareness

among environmental planners and decision-makers of the existence of alternative environmental management systems from which we can learn, as Menzies and Butler (2006), Whyte (2013), Bocco and Winklerprins (2016) and others advocate. Rather, environmental planning processes must be enabled to recognise and respond to alternative environmental management systems underpinned by different ways of knowing. To do that, requires a critical analysis of the overt and covert power and knowledge structures that underpin and reinforce environmental planning processes, to see how far the 'bootlaces have to be undone' to enable change to occur. I attempt such an analysis in Section 8.4.

8.4 Discourse Analysis of Environmental Planning Processes

In Chapter Three, I described discourse analysis as an analytical tool which is used to help generate insights in social science research undertaken within approaches that are broadly social-constructionist, including critical hermeneutics (Sharp & Richardson, 2010). Discourse analysis is used to explore the policy and planning process per se; to assess how understandings of environmental issues and solutions are developed, and how policy conflicts are routinised, negotiated and enacted (Hajer, 1996; Sharp & Richardson, 2010). As noted in Chapter Three, there are a variety of forms of discourse analysis used in environmental planning and policy research, which are differentiated by underlying assumptions about the drivers of social interaction and conflict. Sharp and Richardson (2010, p.198) argue that Foucauldian-inspired Discourse Analysis opens up the possibility of interpreting environmental policy and planning processes as neither a rational scientific process nor a rational deliberative process, but as power struggles between different interests where knowledge and truth are contested and the rationality of policy-making is exposed as a focus for conflict. To that end, a Foucauldian-inspired Discourse Analysis complements the argument presented in this research that conflict in environmental planning processes is underpinned by different understandings of who holds or ought to hold power and knowledge in environmental management, and the underlying structures that legitimise those views.

Like any aspects of the research process, choosing to undertake a particular form of discourse analysis will colour my research by opening up one area of analysis and closing off others. To that end, I am conscious of a particular point that has been discussed throughout this research about the reluctance of participants to publicly criticise other farming practices or challenge agri-science. This aspect of the participants' farming culture lends itself to a Habermasian-inspired Discourse Analysis about the extent to which communication collectives may affect change within environmental planning processes. On the other hand, I am conscious of participants who told of their experiences engaging in environmental planning processes and feeling that they are not heard, which suggests that other factors than communication collectives may be drivers of continuity or change in environmental planning processes. Therefore, I have decided to focus on power/knowledge structures using a Foucauldian-inspired Discourse Analysis.

Arribas-Ayllon and Walkerdine (2017) note that Foucault's approach to discourse analysis changed over time and topic, and that his ideas can be challenging to apply. They refer to Foucault's own description of his framework as a history of 'focal points of experience' which he studied along three axes: knowledge, power and ethics (Foucault, 1972, in Arribas-Ayllon and Walkerdine, 2017, p.2). Therefore I have

undertaken this analysis focusing on the three axes of power, knowledge and ethics in relation to three steps in environmental planning processes: problem identification; selection and assessment of management options; and implementation of the preferred option(s). This analysis is summarised in Figure 43 (p.169). For ease of interpretation, I have assumed environmental planning processes proceed in accordance with Rational Planning Theory and a Rational-comprehensive Planning model as set out in the RMA. I readily acknowledge arguments by Lindblom (1959, 1980) and others that, in reality, a rational planning process is more disjointed and incremental. However, in some form and order, environmental planning processes involve aspects of issue identification, response and implementation. The analysis considers both overt power/knowledge relationships (shown in black text) and covert relationships (shown in blue text). Silences in the process are shown in red text. For clarity, in Figure 43 I have referred to the participants as 'farmers'. I have based my analysis on the environmental planning processes described by the participants in the case studies in Chapter Seven. As such, Figure 43 is not comprehensive of all environmental planning processes nor is it a comprehensive discourse analysis of every aspect of those environmental planning processes. As Cohn (2005 in Stainton Rogers & Wilig, 2017, p.15) notes, "…interpretation is inexhaustible."

In summary, the participants do not perceive they have any influence in environmental planning processes, as shown in the overt power relationships in Figure 43 (p.169). This perception is reinforced in the narratives by comments such as, "we try hard to understand the planners, but they never try to understand us" (F19 & F49). However the covert power relationships (blue text) depict that farmers wield considerable influence in determining the extent to which environmental planning processes achieve environmental outcomes on the ground. Most significantly, the silences (red text) demonstrate a lack of acknowledgment by planners and decision-makers of this covert power of farmers. Rather, the silences legitimise and reinforce current environmental planning processes but limit their efficacy in addressing environmental issues on farm.

The overt relationships show planners holding the power in environmental planning processes; both as technical advisors to the environmental regulator and as decision-makers (Hearing Commissioners) on behalf of the environmental regulator. In these capacities, planners define environmental issues, which determines how issues are understood and who is affected. Planners legitimise those decisions by reference to the statutory planning framework. Also, planners determine whose knowledge is included in the environmental planning process, relying on both the rules around expert evidence in the New Zealand Environment Court Code of Conduct for Expert Witnesses (Ministry of Justice, 2014) which denotes a hierarchy of knowledge based on academic qualifications, and their power as identifiers of both problems and solutions in the planning process.

Figure 43: Overt and Covert Power Structures in Environmental Planning Process

	Problem Definition	Response Identification	Response Implementation
Power	**Planner** defines problem - 'scientific' or 'expert' knowledge, public perceptions & statutory responsibility. Farmers' power as landholders & resource users is not considered. **Farmers** decide whether the problem applies on their farm & whether & to what extent they 'buy in' to the planning process.	**Planner -** identifies management options based on 'expert' advice & statutory functions. **Hearing Commissioner -** decides management response **Farmers** make submissions on proposed option & all submissions given due consideration. **Farmers** submissions perceived by decision-makers as 'biased' because they are resource users.	**Environmental Regulator** decides when and how to implement the management response. **Environmental Regulator** assumes participants will comply because it is a regulation. **Farmers** choose whether to comply.
Knowledge	**Scientists** in their chosen field & **Planners** in policy & planning, **Agri-scientists** are 'experts' in farming. **Farmers** knowledge is not considered 'expert.' **Social scientists** knowledge is not recognised. **Farmers** hold their own knowledge of local environment & farming place & decide whether the expert knowledge is applicable to their farm.	**Planners** identify management responses based on 'expert' advice from **scientists & agri-scientists.** Limits of agri-science knowledge are not identified. **Farmers** are not used to identify options/responses. **Social scientists** not used to identify options/responses. **Farmers** make own assessments & decide whether to uptake management responses.	**Planners & auditors** monitor & enforce compliance on basis of public or political perception of the importance of the issue & ease of enforcement **Planners & auditors** have limited information about compliance on farm. **Farmers** undertake their own risk assessment about whether & to what extent they need to comply.
Ethics	**Planners** legitimise their issue identification through statutory & professional planning ethics. **Ethics** are silent on inevitable subjectivity. **Farmers** have their own ethics & protocols by which they farm place, and also by which they give advice to or criticise other farmers.	**Planners & environmental regulators** legitimise management responses through statute, 'transparent hearing process & 'independent' decision-making. **Ethics** are silent on inevitable subjectivity. **Farmers** have their own farming ethics which drive whether & to what extent they uptake management responses.	**Environmental Regulator** legitimises implementation as 'the law'. **Farmers** have own ethics that determine how they farm & manage environmental issues.

Key: Black text (overt relationships), red text (silences), blue text (covert relationships)

The overt power that planners, as professional advisors and decision-makers, hold in the planning process is legitimised through ethics. These 'ethics' reinforce the principles of 'objectivity' and 'neutrality' among planners and scientists as knowledge holders and Hearing Commissioners as decision-makers, in three ways. Firstly, the scientists, planners and decision-makers must have no pecuniary or other interests in the proceedings which may render them 'biased' towards particular outcomes (Ministry for the Environment, 2010; Miller, 2017). These values of 'objectivity' and 'neutrality' further alienate farmers and other resource users from having power or knowledge credibility in the planning process by reinforcing the notion that farmers (and other resource users) are acting in economic self-interest and therefore their knowledge cannot be 'trusted'. Secondly, The Environment Court Code of Conduct for Expert Witnesses requires 'expert' witnesses to affirm that in preparing their evidence they have not omitted any information known to them that may be material to the decision-making process (Ministry of Justice, 2014). This process reinforces the notion that the information provided by planners and scientists is 'comprehensive' and 'balanced', and therefore superior to lay information or evidence. Finally, planners and scientists give evidence and Hearing Commissioners make decisions in a quasi-judicial hearing process, where all information which informs the decision-making process can be viewed and challenged by members of the public (as submitters) (RMA, ss100-103B). In Chapter One, I cited Bührs (2000) observation that the opportunity for public participation or scrutiny in environmental planning processes is assumed to lead to better environmental outcomes.

This 'ethical' system of decision-making undertaken by 'disinterested' professionals, based on 'objective' expert information, reinforces the value of an environmental planning process which separates conservation from resource use and responsibility for environmental management from resource users or landholders. Also, it reinforces the validity of the theoretical knowledge held by academic experts in specified disciplines over experiential knowledge of farmers in place. F19 said in his narrative, "if the planners had come and asked us we could have written them a rule [about fencing livestock out of waterways] that works in half an hour." However, farmers are not identifed by planners as 'experts' in environmental management on-farm, or even as experts in farming, notwithstanding that many farmers hold tertiary academic qualifications in agri-science. Rural social scientists are not identified as holding farming knowledge either – they are silent in environmental planning processes. Rather, planners use agri-scientists to provide knowledge about farming. However, Campbell et al (2009, p.25) argue that rural land use requires a different and broader planning framework than agri-science which concentrates on specific problems in biological economies such as animal or pasture productivity, and specific problems in production landscapes like soil erosion.

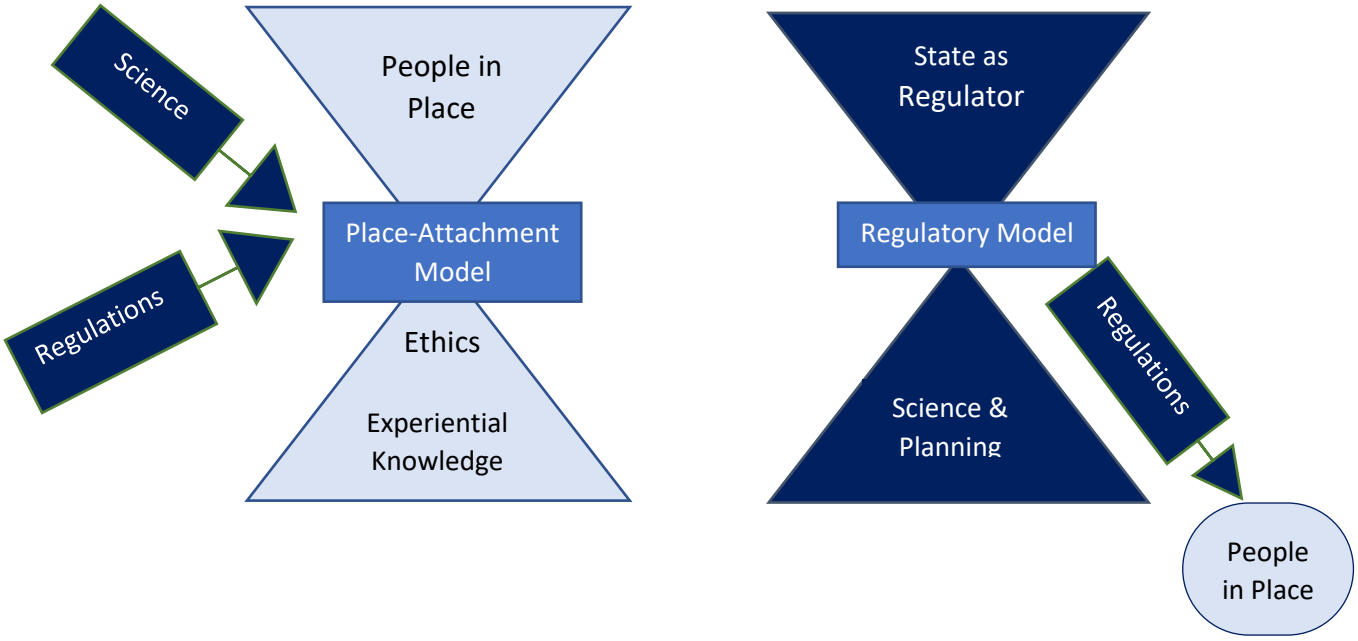
While the participants perceive that planners hold power and knowledge in the environmental planning process, their narratives reveal the extent of their covert influence in determining the efficacy of the environmental planning process in addressing issues on farm. This influence occurs at two levels: the extent to which the participants consider environmental regulations or the advice of agri-scientists in making decisions about how they farm place; and the knowledge the participants hold about their local environment and the environmental impacts of their farming systems. This knowledge enables the participants to make their own judgements about the environmental impacts of their farming systems and to ascertain whether they ought to comply with environmental regulations. Where the participants believe their environmental impacts are minor they tell of continuing to farm place irrespective of compliance with

environmental rules or regulations because they are confident they can defend their farming practices, if necessary. Similarly, where participants may have to comply with environmental regulations, for example because they need planning permission for irrigation or effluent disposal, they tell of 'doing the paperwork' to get the permissions they require. However the 'paperwork' does not strongly shape how they farm in practice, unless they perceive the regulations are necessary and effective.

Jacobs (1999) suggests there is scant evidence that discourse analysis has made an impact on the policy-making community. However, in this research, analysing the power, knowledge and ethics structures which underpin environmental planning processes has helped me identify the extent to which the process must be unravelled before it can recognise and respond to environmental management systems grounded in different ways of knowing. The contemporary environmental planning process in New Zealand is depicted in Figure 44 and labelled the Regulatory Planning Model. This process has, at its core, planners and science 'experts' working for an environmental regulator. The environmental regulator is empowered and legitimised by statute to manage environmental issues and make environmental regulations. The regulator obtains environmental knowledge from 'experts' who hold academic qualifications in a range of specialist disciplines. This knowledge is often synchronic in nature but may be supplemented by local knowledge from landholders or other 'people-in-place' where that local knowledge has been verified by 'experts' as valid. The 'experts' identify the issue and an appropriate management response, usually in the form of regulations, which they impose on people-in-place. People-in-place or resource users may have the opportunity to be involved in the identification of management options through a public planning process. However their credibility to identify appropriate management responses is limited by assumptions made in the planning process that as resource users they will act in 'self-interest' and have no motivation to manage environmental impacts associated with their resource use.

People-in-place, motivated by their goal to remain in place, form the core of non-indigenous intergenerational family farming culture and environmental management systems underpinned by cultural knowledge of place. Therefore, I argue that to reconcile conflict between non-indigenous intergenerational family farmers and environmental planning processes, the 'boot-laces' of the environmental planning process need to be undone and the 'boot' itself reconfigured as a Place-attachment Planning Model. A Place-attachment Planning Model, as depicted in Figure 44 (p.172) places intergenerational people-in-place, with their place-specific knowledge and motivators to address environmental issues, at its core. Specialist scientific knowledge such as ecology or soil science is incorporated into the planning process to a greater or lesser extent, depending on the nature of the local environmental knowledge available. The Place-attachment Planning Model is not the abandonment of environmental planning. In the case studies in Chapter Seven the participants identified the need for environmental regulation to manage some issues, such as freshwater. They also described the existence of several farming systems in Chapter Four, not all of which share the same farming culture. To that end, environmental regulation is still used in the Place-attachment Planning Model, acting as a default position when there are no other appropriate social sanctions to ensure environmental stewardship. In short, environmental regulation becomes the backstop rather than the environmental management system.

Figure 44: Place- Attachment Planning Model (left) and Regulatory Planning Model (right)



In crafting a Place-attachment Planning Model I have gone 'back to the future' borrowing from Friedmann's (1973) Transactive Planning Theory which underpins the planning processes which the participants describe as 'successful,' in Chapters One and Seven, such as QEII Trust Covenants and the 'Catchment Board' model. However Transactive Planning Theory still places the state, as environmental regulator, at the core of the planning process, represented by a planner as a technical 'expert'. A Place-attachment Planning Model recognises that intergenerational people-in-place have both the motivation to address environmental issues and established environmental management systems within which they work. Therefore, scientists, planners and environmental regulators should support rather than supplant those environmental management systems.

Habermas (1973 in Herde, 1999, p.20) claimed that in modern society we, "…take people out of the equation and replace them with 'science'," which he argues is impractical, unhistorical, and removes from the people who have problems, the need to develop the capacity to solve them. A Place-attachment Planning Model returns people-in-place to the core of environmental planning processes not only because they have the knowledge and motivation to address environmental issues, but also the responsibility: it recognises that resource use and resource protection are two sides of the same coin. While a Place-attachment Planning Model has been crafted within the context of reconciling conflict between non-indigenous intergenerational family farmers and environmental planning processes, conceptually it has the potential to be developed as a tool to recognise and reconcile environmental planning processes with other environmental management systems underpinned by different ways of knowing, including Te Ao Tahu and other indigenous TEK systems.

Developing an alternative planning model is one part of the equation, but it begs the question how is such a model to be implemented and legitimised in the eyes of planners, politicians and the public? Afterall, as noted in Chapter One, statutory planning emerged in response to conflicts in land use and social values in the first instance. I do not think it is necessary to make legislative change to implement the Place-attachment Planning Model. If one refers to the purpose of the RMA (s5) and the duty under s32 to be satisfied any policy and method is the most appropriate, the Act may be sufficiently flexible to incorporate the new approach. The statute is, in itself, simply a socially legitimised framework for decision-making. Rather, the challenge is in how that socially legitimised framework is used. Environmental regulators focus on the use of a Regulatory Planning Model as shown in Figure 44 (p.172) to manage environmental issues, including national planning documents which direct the use of regulatory responses, for example the proposed National Policy Statement for Indigenous Biodiversity (2019) referred to in Chapter Seven. Therefore, I suggest the issue lies with changing the assumptions underlying environmental planning processes about who has responsibility for environmental management and how environmental planning is done. This is the point where social science becomes critical; in particular the Biological Economies Team's research discussed in Chapter Two, and critical policy analysis.

Both the Biological Economies Team's research challenges the underlying assumptions about farming and economic-environment relationships which drive contemporary agri-science and environmental planning practice in New Zealand. It places farming in social context, noting the influence of historic social values, agri-science and government policy, in driving a focus on farming as commodity production over the last century; factors which much agri-science and environmental planning literature seems to overlook. Also, the Biological Economies Team's research focuses on the values which underpin rural communities and draws attention to primary production which is interwoven with other rural values including place-attachment, environmental stewardship, animal ethics and family and community values. While Indigenous Planning and TEK focus on similar matters in relation to traditional indigenous culture, the Biological Economies Team's research explores these concepts in a contemporary Western socio-economic context. Finally the concept of biological economies legitimises the possibility of a different understanding of the relationship between economic, environmental and social objectives from Neo-liberalist Planning Theory which has underpinned New Zealand's environmental planning processes for nearly 30 years. It reintroduces the notion of resource users being responsible for resource protection; a responsibility sanctioned not only by personal values but economically incentivised.

The next step is to investigate how the concept of biological economies can be integrated with environmental planning processes to create what the participants in case Study Two (Chapter Seven) requested: a single environmental management programme that meets the requirements of both supply companies and environmental regulators, developed by farmers for farmers. A Place-attachment Planning Model enables this form of integration. Essentially the model would recognise a biological economy as a bone fide environmental management system. Environmental regulation would be necessary only if particular environmental issues are not being appropriately managed within the biological economy. It is immaterial whether the environmental issues are being managed for altruistic

reasons or for economic advantage: it is the environmental outcome which matters not the method by which it is achieved.

A crucial step towards realising a Place-attachment Planning Model is shifting planning practice in New Zealand to a point where it can recognise and validate different ways of knowing and doing environmental management. This is the reason I champion a return to critical policy analysis in New Zealand planning literature, to open the minds of planners and the planning process to other ways of doing planning. After nearly 30 years of following Neo-liberalist Planning Theory, planning in New Zealand is in danger of losing its ideological foundations (Keril 2009, in Sager, 2017, p.108) and accepting Rational Planning Theory underpinned by neo-liberalist principles as the way planning is and ought to be. As such, in Chapter Nine, I argue for the need to return to planning theory and critical policy analysis in New Zealand.

8.5 Conclusions and Reflections

The narratives in this research describe shared understandings among the participants of farmer-farm and farmer-farming relationships; understandings which I have argued amount to a non-indigenous intergenerational family farming culture and associated environmental management system. Epistemologically, I argue the participants' environmental management systems are blended systems, sharing characteristics of both TEK and Western science knowledge systems as depicted in the literature and outlined in Figure 5 (p.30) and Figure 40 (p.160). That blended epistemology reflects the knowledge sources the participants use to understand and practice farming: a combination of diachronic knowledge of place and farming place acquired through previous generations and their own experiences; and synchronic knowledge acquired through studying science and agri-science in formal secondary and tertiary education. However, I have concluded that the participants' farming culture is underpinned by understandings of core concepts such as human-environment relationships, economic-environment relationships, farming and valid forms of knowledge that differ from those underpinning agri-science and contemporary environmental planning processes in New Zealand.

The narratives describe an understanding of the family farm as place and the farmer-farm relationship as one of attachment to place as home and identity. The family farm is not a parcel of land on which to undertake a generic activity called farming. The narratives also described farming as a complex balance of economic, environmental, vocational, familial and communal interaction with place; it is how participants know place and understand their place within place. Non-indigenous intergenerational family farming in Canterbury is embedded; it is cultural knowledge. Whether it is appropriate to describe this cultural knowledge as TEK depends on how one defines TEK and is not pertinent to this research. What is important, is that this farming culture is an alternative environmental management system with different ways of knowing from environmental planning processes in New Zealand. To that end, I argue for evidence of conflict between the participants and environmental planning processes as different ways of knowing. Conflict between alternative environmental management systems underpinned by different ways of knowing can be reconciled. However such reconciliation cannot occur within current environmental planning processes. Rather, the participants' non-indigenous intergenerational family farming culture needs to be recognised and validated as an alternative but equally valid environmental

management system. To achieve that outcome requires the unpeeling and reconfiguring of contemporary environmental planning processes in New Zealand and underlying power and knowledge structures..

Menzies and Butler, (2006), Berkes (2012, 2018), Whyte (2013) and Bocco and Winklerprins (2016) argue that the value in TEK systems is in seeing what it can teach us. What this research has taught me is the value in having environmental planning processes that are sufficiently flexible to recognise and respond to alternative environmental management systems embedded in cultural knowledge. Throughout this research I have analysed similarities and differences in farming knowledge and environmental management systems between participants, and, as outlined in Chapter Four, the participants describe non-indigenous intergenerational family farming as different from other farming systems and practices in Canterbury. Therefore, conflict in environmental planning processes based on different ways of knowing may not be resolved by simply substituting one universalising environmental management system with another. Rather, I have argued for a Place-attachment Planning Model that recognises and works with different environmental management systems over space and time. The model recognises and values intergenerational people-in-place as environmental managers and knowledge holders, and places them at the core of environmental management. It uses specialist 'scientific' knowledge and environmental regulation to support rather than usurp place-specific environmental management systems. Where resource users are not intergenerational people-in-place and do not possess embedded cultural knowledge and associated environmental management systems, the role of specialist scientific knowledge and environmental regulation can be increased. In this model, it does not matter if cultural knowledge can only be understood in ontological context because environmental management starts with those who are.

The next challenge is how to affect such change in the environmental planning process? Such changes are unlikely to be brought about by amendments to legislation or 'good practice' planning guidelines. As discussed in Section 8.3, the efficacy of epistemological change is limited if it focuses on methods or practice without challenging underlying assumptions or ideologies. For example, I have been asked to present my research findings to staff at a regional council, so they can improve their engagement with farmers. My challenge is how to convey the validity of environmental management systems underpinned by different ways of knowing to an audience of environmental planners and scientists educated largely within positivist research frameworks and Rational Planning Theory?

I believe an answer lies in how we understand and enact economic and environment relationships in farming, and how we research and teach environmental policy and planning in New Zealand. In Chapters One and Two, I made a case that contemporary environmental planning processes rely on agri-science literature for their understanding of farming and farmer-environment relationships. Consequently, farming is viewed as an 'economic versus environment' proposition with farmers unaware or uncaring of the environmental impacts of farming. Throughout this thesis I have argued for a place-attachment relationship among the participants and a farming culture grounded in understandings of farming as a balancing of economic, environmental and socio-cultural factors; a concept supported by social science research in New Zealand. Such research includes the work of the Biological Economies Team who has explored the production of niche products within rural communities underpinned by the social and

environmental values of people-in-place. In this chapter, I have argued the Biological Economies research provides evidence of different forms of rural production and farmer-environment relationship from those assumed in agri-science literature, and a potential catalyst for recognising and legitimising farmer-led environmental management systems in environmental planning processes. However, to make that transition, planning practice in New Zealand needs an overhaul from its ideological 'boots' up and that requires a return to critical policy analysis.

In Chapter Two I argued that most literature in New Zealand on environmental policy and planning sits within Hall's (1992) category of planning practice, focusing on planning method and the management of specific environmental issues. This literature is grounded in Modernist Planning Theory and underpinned by neo-liberalist principles. There is scant evidence in New Zealand planning literature of anyone taking up Sandercock's (2004) critique of the assumptions which underpin Modernist Planning Theory or Keril's (2009) or Sager's (2017) critical analysis of Neo-liberalist Planning Theory. Yet, as outlined in Chapter One, the ideological foundations of neo-liberalism that drove state sector restructuring and resource management law reform in New Zealand in the late 1980s turned environmental planning on its head. It introduced notions such as separating responsibility for the use and protection of natural resources as potentially conflicting goals, and shifting the responsibility for environmental management from resource users to environmental regulators, the latter working in isolation from and increasingly in conflict with the very people they need to partner to achieve environmental outcomes. It has struck me in this research, how radical those changes to environmental planning processes were. Yet as discussed in Chapter Two, thirty years on there is little contemporary, critical policy analysis of environmental planning processes in New Zealand. Rather, the discipline is becoming ensconced in acceptance that this is how planning is and ought to be. Until those notions are challenged, planning practice in New Zealand will struggle to manage conflict resulting from different ways of knowing, or be in a position to re-integrate environmental management with the economic and social systems with which, in practice, it is inextricably linked.

CHAPTER NINE Conclusions and Reflections

9.1 Revisiting the Scene

New Zealand Parliamentary Commissioner for the Environment Dr Jan Wright (2013, p.7) described the environmental impacts of dairy farming on freshwater in New Zealand as, "…a classic economics versus the environment dilemma". However post-modernist theorists have long argued that conflict in planning or resource management is often the product of different ways of knowing between planners and people-in-place (For example, Friedmann, 1973, 2008; Forester, 1989 in Hillier & Huxley, 2008; Carroll & Hendrix, 1992; Herde, 1999; Howitt, 2001; Sandercock, 2003, 2004; Goldblatt, 2004). This thesis has turned on a simple question – who is right, at least when it comes to the interface of farming and environmental planning processes in Canterbury, New Zealand? My answer to that question is both, depending on context. This chapter, in summarising and reflecting on my research, justifies that answer. The chapter is presented in four sections. This section revisits the origins of my research and my research questions; Section 9.2 contains my conclusions and reflections on the subject matter of the research; and Section 9.3 reflects on the research process itself. Finally, Section 9.4 discusses the contribution this research has made to knowledge on farmer-environment relationships and environmental planning processes in New Zealand and identifies areas for further research.

In Chapter One I described how, as both an environmental planner and part of a non-indigenous intergenerational farming family and community, I struggled with explanations of conflict at the interface of farming and environmental planning processes as an 'economic versus environment' proposition. Of course economics plays an important role in farming in New Zealand, but I believe the relationship between non-indigenous intergenerational family farmers and the environment is more complex than a simple 'economic versus environment' proposition. It was my attempt to answer this question which has been the catalyst for this PhD. I described how initially I had assumed conflict at the interface of farming and environmental planning processes resulted from gaps in planners' knowledge about farming practices and that once agri-scientists and farmers became more involved in these processes, such conflicts would reduce. However, my observations of the freshwater planning process in Canterbury was that agri-scientists and rural policy advisors share the planners' perceptions of conflict between farmers and environmental planning processes as an 'economic versus environment' proposition. The farmers involved in the freshwater planning processes either did not challenge these assumptions or they were not heard.

It was through my role as an environmental planner for Te Rūnanga o Ngāi Tahu, the iwi authority over much of the South Island of New Zealand, that I started thinking about non-indigenous intergenerational family farming as cultural knowledge. I am not suggesting that non-indigenous intergenerational family farmers share Ngāi Tahu cultural knowledge, rather that, similar to Ngāi Tahu whānui, they have ways of farming land which are shaped by their longevity in and attachment to place; and ways of knowing their environment from working in nature, over generations. To that end, I began to question whether some conflict at the interface of farming and environmental planning process is the product of friction between environmental management systems underpinned by different ways of knowing? If so, the answers to my questions may not be found within conventional New Zealand agri-science or environmental planning

literature, but they may be found by borrowing concepts, methodology and observations from literature on Indigenous Planning and TEK.

This research has sought to answer two questions through achieving three tasks. The first task was to identify, articulate and name the ways of knowing and doing farming among non-indigenous intergenerational family farmers in Canterbury, New Zealand – to name the un-named. Having identified and articulated non-indigenous intergenerational family farming culture, the next task was to answer my first research question: is conflict between non-indigenous intergenerational family farmers and environmental planning processes an 'economic versus environment' proposition or conflict between alternative environmental management systems underpinned by different ways of knowing? The final task was to answer my second research question: whether and how alternative environmental management systems underpinned by different ways of knowing can be recognised and reconciled in environmental planning processes? As my research progressed two additional questions emerged. Firstly, how do I 'sell' to environmental planners and decision-makers the notion of non-indigenous intergenerational family farmers in Canterbury as knowledgeable and caring about the environment when both historic and contemporary evidence indicates farming practices in Canterbury have adverse environmental effects? My answer to that question led me to another question: if there are multiple ways of knowing and doing farming in Canterbury, how is that reconciled with environmental planning processes underpinned by an understanding of knowledge as conceptual and fixed? My conclusions are addressed in Section 9.2 below.

9.2 Non-indigenous Intergenerational Family Farming Culture and Environmental Planning Processes

To name, describe and articulate the participants' farming culture and ways of knowing, concepts and methodology were borrowed from the literature on Indigenous Planning and TEK. As discussed in Chapters One and Two, there is no one agreed definition of TEK in academic literature, but there are agreed characteristics of TEK which are contrasted with Western science to illustrate different ways of knowing. Key indicators or signposts for different ways of knowing are summarised in Figure 4 (p.30). Researching within a critical hermeneutic framework and assuming an enactive research approach, I used the method of narration to create data on non-indigenous intergenerational family farming culture, in Canterbury, New Zealand. Fifty-two oral narratives were created of the farming life-stories of intergenerational family farmers and analysed, along with the written narratives of a further thirty families.

As explained in Chapter One, participants may be of Anglo-Celtic, Anglo-Māori or other ancestry but the farming systems with which they engage are based on crops, livestock, land husbandry techniques and land ownership systems introduced to New Zealand by predominantly British settlers. Therefore, I have described their farming culture as 'non-indigenous'. Of course, there are generations of Ngāi Tahu whānui and their ancestors who have much longer place-attachment relationships to land in Canterbury than the research participants, and thesis is not an attempt to silence or diminish those relationships. Rather, as discussed in Section 1.3, my association with Ngāi Tahu whānui has been influential in this research.

The narratives were critically analysed for both context and context. From my interpretation and analysis of the narratives, I created three narratives of my own describing how the participants understand the family farm as place, farming as an activity, and the acquisition of farming knowledge and process of decision-making. These three themes reflect key potential differences in ways of knowing depicted in Figure 4 (p.30): human-environment relationships and nature, farming, and valid forms of knowledge and learning. In Chapter Seven, I undertook two cases studies of the participants' experiences with and perceptions of environmental planning processes for protecting conservation sites or SNAs on farm and managing effects of farming activities on freshwater. Those case studies support the arguments I made in Chapters Four to Six. In Chapter Eight, I argued that the narratives describe a farming culture which, epistemologically, is a blended system sharing characteristics of both TEK and Western agri-science knowledge systems. However some of the differences between the participants' farming culture and understandings of farming in Western agri-science (and environmental planning processes) occur at a fundamental, some people may argue an ontological, level with respect to human-environment relationships, the activity of farming, and valid forms of knowledge and knowing.

The participants do not describe farming as an economic activity, nor is the family farm a medium on which to undertake a generic activity called farming. Rather, the narratives describe the family farm as place and the participants' relationship to the family farm is one of attachment to place as home and identity. The activity of farming is described as an integrated system of economic activity, in-situ environmental management, vocation, and familial and communal interaction, which is place-specific. Both the family farm and nature are described as independent entities which are characterised, personified and, in the case of nature, feminised. The goal of the participants is to remain in place, and farming is the means to generate income to remain in place. To that end, there is an economic-environment relationship described in the narratives, but farming is not a simple 'economic versus environment' proposition: farming is not understood as 'competing values of utility of land' (Howitt, 2001, p.59). Rather farming, as a proposition, may be better described as 'economic ***and*** environment ***and*** socio-cultural, ***in place'***. The participants acquire their farming and environmental knowledge from a combination of diachronic and synchronic sources, including knowledge handed down from previous generations, their own experiences and observations from being in and farming place, and agri-science and other sciences. However, for farming purposes, diachronic place-specific knowledge is valued as more appropriate than generalised synchronic knowledge. To borrow Butler's (2006, p.108) description, the participants' farming culture is 'an alternative resource management system' from agri-science and the environmental planning process. Some may argue is it a form of TEK, and TEK is certainly a term known to and used by some of the participants in this research (F11, F12, F16, F39 & F53). In this thesis I have named it a place-attachment farming culture. The pertinent point for this research is that it is a different way of knowing farming from agri-science, and environmental planning processes which rely on agri-science for their understanding of farming.

Throughout this research, I have observed differences as well as similarities in ways of knowing and doing farming between the participants. In Chapters Four and Five, I argued the farming and environmental management systems of dairy participants differ from arable and drystock participants. Also, I argued for differences in local environmental knowledge and adaptation of farming to local environmental conditions, depending on longevity in place. I discussed these differences with the

research participants in the feedback sessions. I have concluded these differences arise from several factors including: longevity in place and associated environmental knowledge; farming background, particularly experience in arable farming; and fiscal circumstances. I note that other researchers have made a case for 'differences' between the farming motivators and environmental management practices of dairy farmers and other farmers, for example Morris et al (1995), Jay (2006, undated), Blackett and Le Heron (2008), Stock and Peoples (2012) and Le Heron (2016, 2018). The purpose of this research is not to make a case that one form of farming knowledge or practice is better than another; nor for one, universal causal explanation for why some farmers place more emphasis on economic aspects of farming than others. Rather, it is to argue a case for farming knowledge, motivators and practices, as contextual and varied over time and space.

The existence of different farming knowledges and environmental management systems in Canterbury explains different patterns of conflict between farmers and environmental planning processes, and may explain the negative perceptions of dairy farming expressed by many of the participants, as noted in Chapter Four. Essentially, contemporary dairy farming in Canterbury is a different farming and environmental management system, which the non-dairy participants perceive as requiring less knowledge and skills and having greater environmental impacts, than arable or drystock farming. Yet it is the farming and environmental management system that is recognised as 'farming' in contemporary environmental planning processes in Canterbury, particularly in relation to freshwater. Conflict ensues not from different forms of farming and environmental management per se, but because environmental planning processes seek simplistic, universalising understandings of farming and explanations of conflict (between farmers and planning processes), underpinned by assumptions of knowledge as conceptual, fixed and general.

As noted in Section 9.1 above, one of the challenges in this research is reconciling a notion of non-indigenous intergenerational family farming culture based on a respectful and reciprocal relationship with nature, with both historic and contemporary environmental effects of farming. In Chapter One, I cited Berkes (2012) observation that indigenous TEK is not environmentally benign but adaptive, addressing environmental effects to ensure the farming system can sustain the community long-term. Similarly, the participants in this research all acknowledge that farming has environmental impacts but say their attachment to place and desire to remain in place motivates them to adapt their farming systems to address environmental effects. Also, the participants said that social values change over time, and while their forebears may have cleared indigenous vegetation or drained wetlands, at that time those activities were regarded as 'progress' and were fiscally subsidised by previous governments. The participants suggest that, for their generation, retaining wild ecosystems on farm is important. This notion of environmental responsiveness is reinforced in the case studies in Chapter Seven. No participant suggested effects of farming on indigenous biodiversity and freshwater should not be addressed. Rather, their criticisms focused on the efficacy of the planning methods used to address the issue, which is consistent with Carroll and Hendrix's (1992) argument that planning processes and people-in-place usually share the same values, the conflict is in ways of knowing and doing.

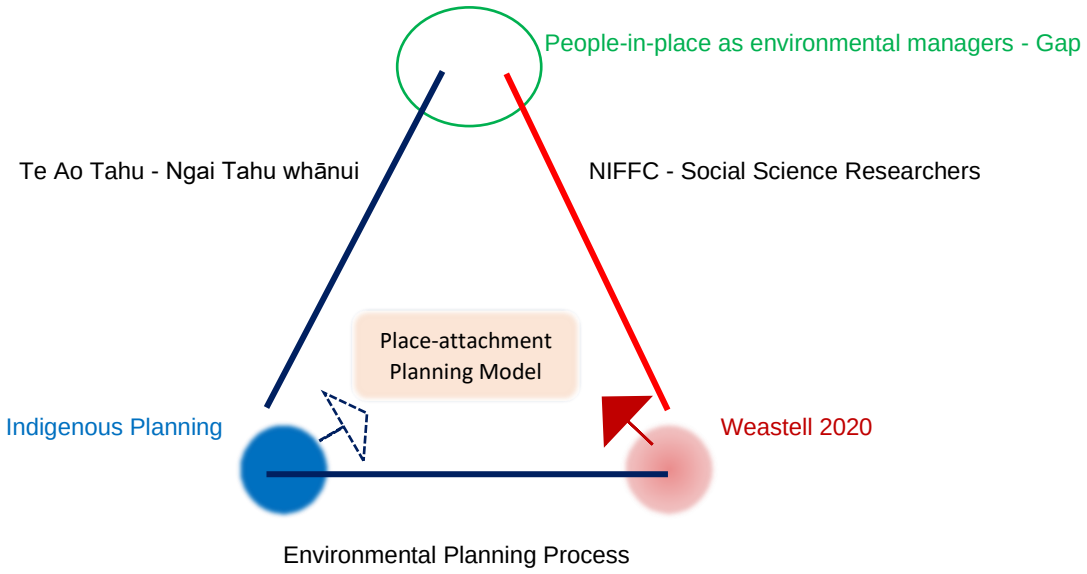
In Chapter One, I argued that contemporary environmental planning processes in New Zealand are ensconced in Modernist or Rational Planning Theory and underpinned by neo-liberalist socio-economic and socio-political constructs. To that end, they share Western scientific understandings of the human-environment relationship and valid forms of knowledge, married with assumptions that farming is an economic activity, and that economic and environmental goals conflict. I argued these ideological foundations determine how the environmental planning process interprets and manages environmental issues, and limits its ability to recognise and respond to different ways of knowing. This research supports the notion of non-indigenous intergenerational family farming as an environmental management system based on different ways of knowing human-environment relationships, farming, and valid forms of knowledge, from those which underpin contemporary environmental planning processes in New Zealand. Therefore conflict between the two systems is, as Howitt suggests (2001), tension between alternative environmental management systems underpinned by different ways of knowing. Undoubtedly, some conflict between farmers and environmental planning processes in Canterbury is an 'economic versus environment' proposition. However it is not a universalising explanation for all conflict at the interface of farming and environmental planning processes.

Underlying assumptions about valid forms of knowledge, blind environmental planning processes to recognising non-indigenous intergenerational family farmers as experts in farming or local environmental knowledge. Even if environmental planners and decision-makers were to recognise non-indigenous intergenerational family farmers as experts in farming knowledge, understandings of farming as an economic activity, and that economic and environmental values conflict, act as barriers to enabling environmental planning processes to adopt environmental management systems that accord with non-indigenous intergenerational family farming culture. In short, the environmental planning process cannot comprehend that non-indigenous intergenerational family farmers are self-motivated to address environmental issues, or that the ecological integrity of indigenous ecosystems can be maintained while farming land in conservative ways. Thereby it discounts potentially efficient and effective options to retain and enhance indigenous biodiversity on intergenerational family farms.

These conclusions led me to explore whether and how contemporary environmental planning processes in New Zealand could be modified to recognise and accommodate non-indigenous intergenerational family farming culture as an environmental management system in Chapter Eight. Figure 41 (p.163) identified epistemological differences between the planning processes examined in the case studies in Chapter Seven, and how the participants said they would manage those issues if they could 'hold the planner's pen.' However, I questioned the efficacy of making changes to planning practice without corresponding changes in planning ideology. I argued that to address conflict and ultimately improve environmental outcomes, the ideological foundations of the environmental planning process have to change. To effect such change requires a critical analysis of the power and knowledge structures that legitimise and reinforce those foundations. Therefore, in Chapter Eight I undertook a Foucauldian-inspired Discourse Analysis of the environmental planning processes described by the participants in the case studies in Chapter Seven, identifying both overt and covert power and knowledge structures in those processes. I concluded that the contemporary environmental planning process, which I labelled the Regulatory Planning Model, ought to be reconfigured as a Place-attachment Planning Model. Both models are depicted in Figure 44 (p.172).

The Regulatory Planning Model in Figure 44 (p.172) places planners and academically qualified 'experts' in specialist disciplines at the core of the process. These planners and other 'experts' are legitimised in environmental planning processes as valid knowledge holders and empowered, by statute, to impose environmental regulation on landholders or other resource users. In a Place-attachment Planning Model, intergenerational people-in-place and knowledge-of-place are at the core of environmental planning processes, and specialist scientific knowledge and environmental regulations are used to support rather than supplant that system. To that end, I am not arguing for abandoning statutory planning processes and environmental regulation. The participants acknowledge environmental regulation is necessary to manage some effects of farming activities on the environment, but they challenge the efficacy with which it is currently employed. The Place-attachment Planning Model is not novel, rather it expands on Transactive Planning Theory and planning processes based on that theory which participants identifed as 'successful' such as the QEII Trust and the 'Catchment Board' model. The point of difference from Transactive Planning Theory is that a Place-attachment Planning model does not start from the presumption that conservation or environmental management and, therefore environmental planning, must be initiated by the state.

Figure 45: Developing the 'Triangle' of Environmental Management in Canterbury



As discussed in Section 1.4, this thesis is a foundational step in a wider exploration of environmental management systems based on intergenerational place-attachment relationships in New Zealand, and how those relationships may shape environmental planning processes into the future: to develop the 'triangle of environmental management in Canterbury' shown in Figure 1 (p.11). In Chapter Two, Figure 5 (p.46) depicted the extent to which that 'triangle' in Figure 1 has been developed through existing literature. Figure 45 above illustrates the extent to which I argue the 'triangle' is further developed by this research and the remaining gaps. This research has added to the 'triangle' in three ways. It has added to existing literature on aspects of non-indigenous intergenerational family farming culture to offer a more comprehensive picture of that farming culture and associated environmental management systems in Canterbury, New Zealand. It has addressed a 'gap' in the literature on understanding conflict between

that cohort of farmers and contemporary environmental planning processes. Finally, it has explored how that conflict may be reconciled through a Place-attachment Planning Model and considered whether that model may have a wider application for incorporating cultural knowledge of people-in-place into environmental planning processes.

Moving to a Place-attachment Planning Model or any alternative planning approach requires critical analysis and review of how environmental planning is understood, researched, and practised in New Zealand. In parallel to the call from Campbell et al (2009) to rethink how New Zealand policy-makers understand rural economies and land use, I am arguing for the need for planners, policy-makers and academics in New Zealand to rethink how we understand and undertake environmental planning. As Duncan (2016) suggests, we are getting stuck and as Forester (1989 in Hillier & Huxley, 2008) suggests, planning theory helps when planners get stuck. How the remaining gaps in the triangle may be addressed through further research is discussed in Section 9.4.

8.3 Reflections on Research Methodology

As noted in Chapter Two, Liamputtong and Ezzy (2005) argue that the research framework and methods used for social science research should correlate with the research topic and with one another. In Chapter Three I justified my choice to use a hermeneutic research framework, an enactive research approach and narrative analysis, due to both my positionality and the nature of the research topic. However it is not a methodology commonly used in conventional agri-science and environmental planning literature in New Zealand. In this section, I describe my observations and reflections on the research process.

Throughout this research I have recorded how using this research framework and method has elicited different insights from research on farmer-environment relationships in conventional New Zealand agri-science and environmental planning literature, and enabled me to understand the topic through 'fresh eyes'. In addition, using a hermeneutic research framework has heightened my awareness of the role which both methodology and researcher play in determining research participation and findings. In Chapter Three, I discussed the high level of participation in this research and that when I asked my research participants why they were so willing to engage, they identifed three factors: a researcher whom they know and trust; a topic which they think is worth researching; and the research method – the opportunity to tell their stories in their own words. One of the benefits of shared cultural knowledge between researcher and participants may be identifying research topics which matter to the participants and using a methodology which accords with how participants prefer to share knowledge. In Chapter Two, I noted that TEK researchers such as Herde (1999), Porter (2004), Berkes (2012, 2018), KIVU (2015) and Kindon (2016) argue for the benefits of researchers who are 'insiders' because that relationship provides the researcher with an entrée into the community and because the researcher understands the significance of what is said. I noted Porter's observation (2004, in Sandercock, 2004, p.123) of having to 'unpack her assumptions' about research objectives and methods in order to understand what really matters to indigenous people. However what surprised me in this research process is how 'insider' knowledge can limit understanding and interpretation. In short, it is hard to identify and articulate your own culture. In Chapter Two, I recalled Herde (1999, p.52) distinction between

epistemological hermeneutics or understanding by doing, and ontological hermeneutics or understanding by being and her argument the latter provides a superior level of understanding. However, in my experience, that superior level of understanding can also be a barrier to identification and interpretation of relevant factors. Jorgenson and Phillips (2002, p.27) argue that when working with discourses close to oneself it is particularly difficult to treat them as socially-constructed meaning systems because the researcher shares many of the taken-for-granted, 'common sense' understandings that are expressed in the material. Throughout my research, I was concerned that I may be omitting factors relevant to the topic because they are ingrained knowledge and, as such, I am failing to recognise them as particular to the participants' farming culture. I was also torn at times between what I considered was my duty as a researcher to interpret and retell the narratives accurately with my trust relationships. In short, how do I explain that most of the narratives from non-dairy farmers about dairy farming in Canterbury were brutal, without saying so? Or how do I relay the criticisms about agri-science without causing offence? And why am I so anxious not to cause offence? The research process became as much an exercise in identifying and articulating my culture to myself, as to others. To that end, an enactive research process was vital to my interpretation and analysis of the participants' farming culture, as were the questions from my supervisor, and the use of indicator characteristics of different ways of knowing depicted in Figures 4 (p.30) and 40 (p.160).

From my observations, researching in a hermeneutic framework appears to beget a greater range of 'credible' data compared with research in a positivist framework. In a hermeneutic research framework data is not disregarded simply because it has not been generated using consistent, repeatable methods under identical conditions; rather it is accepted within context. Similarly, interpreting data in a hermeneutic research framework is not limited to describing the results and any deductions that may be made. There is room to question, speculate and reflect on the data and what it may mean with participants and others, and for those conversations to colour the researcher's interpretations. Throughout this research I have compared my findings with other literature on aspects of the farmer-environment relationship; some of which make similar arguments to my own, and some of which, differ. Within a positivist research framework that assumes universal causal explanations for human behaviour, research becomes contested knowledge. In a hermeneutic research framework research which suggests different causal relationships for the same human behaviour adds to understanding, and knowledge becomes contested only to the extent a researcher argues their findings are universalising.

Scholars researching in hermeneutic frameworks advocate for the use of story-telling as a means to understand issues and collect data (for example, Dryzek, 1989; Herde, 1999; Sandercock, 2004; KIVU, 2015; Winchester & Rolfe, 2016) and in Chapter Three I explained why I chose oral narratives as a means to generate data. However, this research process has illustrated for me the power of story-telling not only in terms of the data it yields but how it influences the way issues are understood. In Chapter Two, I recorded Winchester & Rolfe's (2016, p.17) note that, "People's own words tell us a great deal about their experiences and attitudes, but they may also reveal underlying social structures" and Herde (1999, p.4) argues that, "Language can either mask or reveal problems that traditionally have been left skirted or unspoken." The first thing I observed was that asking people to tell their story means the participants, rather than the researcher, decide what is important to discuss and in what context. For example, in Chapter Five I observed that McLintock (2018) found differing perceptions of the impact of climate change

among her participants, but in my research climate change was not discussed separately from weather patterns generally. Similarly, in Chapter Six, I noted that Nuthall (2019 in Williams, 2019) argues that rules and regulations are the biggest cause of stress for contemporary farmers in New Zealand, yet compliance with rules and regulations was not identifed by any of the participants as a major factor they consider in decision-making on farm. In Chapter Three, I referred to Cronon's (1999) research looking at three narratives offering different interpretations of the causes and impacts of soil erosion in the USA in the 1930s, all of which used the same data sources. Similarly, throughout this research, I became very aware of my influence in how the narratives were interpreted and retold. To that end, I used the feedback process with participants to add credibility to my interpretations of the narratives.

This research highlighted for me not only the importance of story-telling but whether those stories are heard. The narrative of agri-scientists had a much stronger influence in environmental planning processes for freshwater in Canterbury than farmers' narratives because agri-scientists are perceived by planners and decision-makers as having valid knowledge about farming. Similarly, the dairy farming story, as told by Dairy NZ and Fonterra, had arguably a greater influence in the freshwater planning process than other farming sectors, judging by the planning outcomes. Yet, despite the strong views arable and drystock participants expressed about dairy farming within the anonymity of this research, publicly they have not spoken out against dairy farming. This scenario has left me pondering at what point is that protocol broken and the story told? I think the answer is, when not telling the story threatens the ability to remain in place. For many participants that trigger has been the freshwater planning process. F47 asked the question, "how have we lost our influence and how do we address that?" and F11 said that they think this research is important in telling the story because, "it is academic' research and will have credibility." That's a big task for one thesis! I think the challenge for non-indigenous intergenerational family farmers is how to tell their story in ways which are going to influence policy-making and planning processes and public perceptions, but which sit comfortably with their own cultural ethics. The challenge for planners and policy-makers is to create an environmental planning process that can hear and respond.

As explained in Chapter Two, critical hermeneutic research frameworks go beyond seeking to interpret and understand, and use research to improve social conditions (Rickman, 1988; Herde 1999). Dombroski and Huong (2018, p.7) suggest that one of the challenges facing social science researchers on climate change is to answer the call, "…to help find new ways to live with the earth." They argue social scientists are trained to identify pattern and to critique, but not necessarily to come up with a solution: my second research question sought to do that. As explained in Chapters One, Two and Eight, conflict in planning as a product of different ways of knowing is well-recognised in international planning literature if not in contemporary planning practice in New Zealand. However, the solutions do not advance beyond the point of collaboration and co-production of knowledge or, in the case of Indigenous Planning Theory, disestablishment of colonial planning frameworks in favour of indigenous ones. A key but challenging part of this research was to not only critique and review, but to offer a solution. As a practicing planner with 25 years' experience, it was not enough to critique and review or offer a solution which is theoretically neat but practically out of reach. While work needs to be done to take a Place-attachment Planning Model from conception to planning practice, I am convinced of its potential.

9.4 Contributions to Research and Further Research

If I were to describe where this research fits within academic literature, I would describe it as making a contribution to planning theory and practice but nesting at the intersections of several disciplines. Just as my research topic has emerged from my positionality walking in three worlds of environmental policy and planning, intergenerational family farming, and Ngāi Tahu whānui, I have drawn on literature within agri-science, rural social sciences such as human geography and sociology, planning and critical policy analysis, and TEK. Through identifying, naming and articulating the participants' farming culture and associated environmental management systems, I believe this research makes an original contribution to understanding farmer-environment relationships and farming in New Zealand. Though the analysis of conflict between participants and environmental planning processes, and proposing the Place-attachment Planning Model, I believe this research makes a contribution to both environmental planning practice in New Zealand and planning theory generally. Finally, in this section, I make these arguments and recommendations for further research.

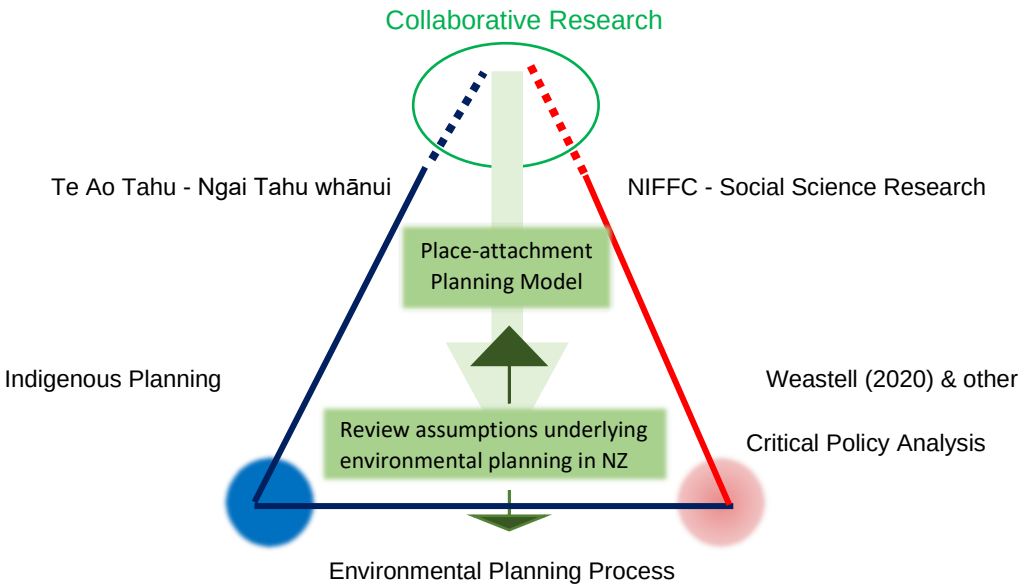
To date, I have not found any research that attempts to identify, articulate and name intergenerational family farming culture in New Zealand, or to mount an argument for a different way of knowing farming from environmental planning processes. In Chapter Two, I referred to the work of the New Biological Economies Team (Campbell et al 2009, 2016; Pawson et al 2018) which has undertaken similar research into farmer-economic relationships in New Zealand and challenged the narrow view of farming solely as commodity production that dominates agri-science literature and rural policy-making. Also, I discussed research by social scientists that have observed or explored place-attachment relationships among family farmers in New Zealand and challenged prevailing views in science and agri-science about the history of farmers' environmental knowledge and farming practices, eg Morris et al (1995, 1997), Peden (2011) and Holland (2013). This research builds upon and adds to this work. It takes a parallel step in understanding and articulating farmer-environment relationships in New Zealand to the work of the New Biological Economies Team (Campbell et al 2009; Lewis et al, 2013; Le Heron et al, 2016; Pawson et al, 2018) in farmer-economic relationships.

This research has made a contribution to the literature on environmental policy and planning. It challenges the notion of conflict between farming and environmental planning as an 'economic versus environment' proposition in all cases and offers alternative ways of understanding that conflict. Also, this research has coined the concept of a Place-attachment Planning Model which puts people-in-place and place-specific knowledge at its core, as a potential solution to conflict in environmental planning processes underpinned by different ways of knowing. As noted in this research, post-modernist planning theories have long recognised conflict between planning processes and people-in-place resulting from different ways of knowing. However solutions to date have focused on either co-production of knowledge or reinstating indigenous planning systems (Matunga, 2000; Porter, 2004). The literature is short on discussion about what happens when co-production of knowledge is unable to resolve conflict, or how segregated planning systems work in an context where indigenous and Western must co-exist. Finally, this research contributes to the argument for planning theory and critical policy analysis by illustrating how planning in New Zealand has got stuck. As noted in Chapter Two, while there is a substantial body of international literature focused on critical analysis of environmental policy and planning systems and the discipline of

planning, within New Zealand contemporary literature is largely focused on planning practice. This research makes a case for the need to look deeper; to critically analyse the ideological foundations of planning processes to affect change.

While this research has answered my questions discussed in Chapter One, it has raised many more worthy of further research. Therefore I am concluding this thesis by identifying key areas for further research. Figure 46 below shows a final depiction of the 'triangle of environmental management in Canterbury' first depicted in Figure 1(p.11) and modified in Figure 45 (p.183). It illustrates how further research could complete the 'triangle' and change the assumptions about environmental management, human-environment relationships, and valid forms of knowledge which underpin contemporary environmental planning processes in New Zealand. While this research has focused on non-indigenous intergenerational family farming culture and associated environmental management systems, there are other environmental management systems within New Zealand that are underpinned by different ways of knowing from Rational and Neo-Liberalist Planning Theories. As outlined in Chapter Two, the need to recognise and validate Te Ao Māori in environmental planning processes is well-recognised in planning literature. A Place-attachment Planning Model may provide a starting point for a planning process that enables matauranga and tikanga Māori as environmental management systems in their own right. Figure 46 depicts how collaborative research between scholars with ontological understandings of Te Ao Tahu and non-indigenous intergenerational family farming in Canterbury has the potential to explore, with authenticity, similarities and differences in these two environmental knowledge systems. That research has the potential to both: develop a Place-attachment Planning Model that recognises and validates both systems of environmental management in Canterbury; and to challenge assumptions about human-environment relationships and valid forms of knowledge that underpin contemporary environmental planning processes.

Figure 46: Further Research to Complete the 'Triangle' of Environmental Management in Canterbury



To complete the 'triangle' in Figure 46 (p.187), I advocate for further research in three areas. Firstly, the value of non-indigenous intergenerational family farming culture and environmental management systems in New Zealand as a means to manage environmental issues associated with farming. At present, both central and local government in New Zealand rely on agri-science to address environmental effects of farming, resplendent of the tendency Bromley (2004) argues for Western society to rely on technology to solve the environmental problems which technology creates. Consequently, I also argue for a greater level of critical analysis of environmental planning in New Zealand. Despite radical state sector restructuring and resource management law reform in New Zealand in the late 1980s described in Chapter One, some may argue environmental planning processes have had limited success in addressing contemporary environmental issues. Official statistics indicate ongoing decline in the state of both freshwater and indigenous biodiversity within New Zealand, while significant issues have emerged with urban planning (Ministry for the Environment, 2019). Despite these outcomes there is little contemporary research in planning theory or critical policy analysis in New Zealand. Rather, worsening environmental issues are blamed on poor planning practice and decision-making or deficiencies within the legislation (MfE 2019; RMA Technical Working Group, 2012; Parker, 2018). In short, the environmental planning process is criticised for delivering the very outcomes it has been designed, through its ideological foundations, to deliver. Yet, no one is revisiting those ideological foundations. Finally, in Chapter Two I noted researchers such as Johnson (1992) and Bocco and Winklerprins (2016) argue that TEK may be found among non-indigenous communities that work closely with nature. However research on TEK is largely focused on indigenous communities. Bocco and Winklerprins (2016) ask a question, whether TEK is indigenous or whether it simply has not been studied in non-indigenous cultures? This research demonstrates the existence of a place-attachment farming culture among non-indigenous, intergenerational farming families. Research into whether this farming culture is a form of TEK may contribute to understandings of alternative knowledge systems generally, and provide additional pathways for thought on ways to tackle contemporary environmental issues.

Herde (1999, p. 6) suggests that in reflecting on critical hermeneutic research one should ask, "does it change the way you understand the world and therefore yourself?" My answer is yes. In Chapter One I outlined how I have grappled with two things: the notion that farmers put economic values over environmental ones; why non-indigenous intergenerational family farmers are committed to addressing environmental issues yet oppose the environmental planning process; and where I fit as both an environmental planner and part of that farming community. Through this research I now have an explanation for each of my 'grapples'. I know that there are different ways of knowing and doing farming in Canterbury; for some it is solely an economic activity - the commodity production of goods but for others it is a relationship to place. I understand that some farmers oppose environmental planning processes not because they put economic values ahead of environmental ones, but because they have different environmental management systems, systems which are not readily recognised and validated in contemporary environmental planning processes. Finally, I now understand that my love of farming and of wild ecosystems is not a conflict, and that, in this, I am not alone. Rather the activity I understand as farming is one of multiple ways of knowing and doing farming in Canterbury and is different from the understanding of farming that underpins agri-science. I have also learned that, challenging as it might be, it is important that non-indigenous intergenerational family farmers in Canterbury articulate their farming culture to the outside world, legitimised within the protocols of formal academic research. I hope this is a start.

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Aldridge, Brett	Regional Planning Manager, Environment Canterbury (2016)
Hodgen Daniel	Farmer, Pyramid Valley, Hawarden
McFadden, Jamie	Founding member of Hurunui Significant Natural Areas Group and Chairperson of Rural Advocacy Network Inc and farmer, Cheviot.
Singleton, Mike	District Planner, Ashburton District Council (1997).
Tipa, Gail Dr	Principal of Tipa Associates and Kaitiaki Te Rūnanga o Moeraki.

Appendix One: List of Participants & Written Narratives

Oral Participants		
Participant Number	**Land Type & Location**	**Farm Type**
F01L23 (Pilot Study 1)	High Country – Selwyn District	Drystock
F02L23 (Pilot Study 2)	High Country – Selwyn District	Drystock
F03L33	Coastal Hills - Omihi, Hurunui District	Drystock
F04A33	Flat - Sheffield, Selwyn District	Arable
F05D33/1	Flat - Rolleston, Selwyn District	Dairy
F06L43	Hill Country - Hawarden, Hurunui District	Drystock
F07L42	Coastal Hills - Cheviot, Hurunui District	Drystock
F08L43	Coastal Hills - Banks Peninsula	Drystock
F09A23	Flat - Darfield, Selwyn District	Arable
F10L33	Flat - Waipara, Hurunui District	Drystock (Part Irrigated)
F11M43	Flat - Greendale, Selwyn District	Dairy/sheep (Irrigated)
F12L23	Hill Country - Waikari, Hurunui District	Drystock
F13M13	Flat - Waipara, Hurunui District	Drystock/arable (Part Irrigated)
F14D32/1	Flat – Oxford, Waimakariri District	Dairy (Irrigated)
F15M23	Flat - Sheffield, Selwyn District	Arable/deer (Part Irrigated)
F16L43	Foothills - Windwhistle, Selwyn District	Drystock
F17A43	Flat – Lakeside, Selwyn District	Arable (Irrigated)
F18A33	Flat – Southbridge, Selwyn District	Arable (Irrigated)
F19D33	Terraces – Cheviot, Hurunui District	Dairy (Irrigated)
F20D12	Flat – Lincoln, Selwyn District	Dairy (Share-milking)
F21L23	Flat & Hill – Omihi, Hurunui District	Drystock
F22A33	Flat - Cheviot, Hurunui District	Arable (Irrigated)
F23D33/1	Flat – Cust, Waimakariri District	Dairy (Irrigated)
F24D23/1	Flat – Culverden, Hurunui District	Dairy (Irrigated)
F25L13	Flat – Waipara, Hurunui District	Drystock
F26M42	Terraces – Kowai Bush, Selwyn District	Mixed (arable/drystock)
F27L23	Foothills - Methven, Ashburton District	Drystock
F28L23	Hill Country - Scargill, Hurunui District	Drystock
F29L43	Flat – Hororata, Selwyn District	Drystock (Irrigated)
F30L22	Coastal Hills & Flat – Cheviot, Hurunui District	Drystock (Part Irrigated)
F31D13	Terraces – Hurunui Mouth, Hurunui District	Dairy (Irrigated)
F32D13/1	Flat – Oxford, Waimakariri District	Dairy (Irrigated)
F33A23	Flat – Kirwee, Selwyn District	Arable (Part Irrigated)
F34L23	High Country – Waimakariri District	Drystock
F35D13/1	Flat – Dunsandel, Selwyn District	Dairy (Share-milking)
F36D23/1	Terraces – Hurunui, Hurunui District	Dairy (Irrigated)
F37M33	Flat – Coes Ford, Selwyn District	Arable/Dairy (Irrigated)
F38D43	High Country – Selwyn District	Drystock (Part Irrigated)
F39A23	Terraces – Barrhill, Ashburton District	Arable (Irrigated)
F40A23/1	Flat – Valetta, Ashburton District	Arable (Irrigated)
F41D23	High Country – Ashburton District	Drystock
F42D13	High Country – Hurunui District	Drystock
F43A23	Flat – Leeston, Selwyn District	Arable (Irrigated)
F44M33	Flat – Waipara, Hurunui District	Drystock/Grapes (Part Irrigated)
F45A33	Flat – Longbeach, Ashburton District	Arable (Irrigated)
F46D33/1	Flat – Culverden, Hurunui District	Dairy (Irrigated)
F47L43	Foothills – Windwhistle, Selwyn District	Drystock
F48A32	Flat – Cust, Waimakariri District	Arable (Irrigated)
F49A33	Flat – Oxford, Waimakariri District	Arable (Irrigated)

F50L33	Foothills – Ashley Gorge, Waimakariri District	Drystock
F51D33	Foothills – Windwhistle, Selwyn District	Drystock
F52D33	High Country – Hurunui District	Drystock
F53D23	Coastal Hills – Banks Peninsula	Drystock

Written Narratives		
Note: All written narratives are included in List of References under published or unpublished sources		
Author & Publication Date	**Land Type & Location**	**Farm Type**
Anderson M (1968)	High Country – Selwyn District	Drystock
Andrews A (undated)	Flats – Glenavy, Timaru District	Arable
Barker M A (1991)	Foothills – Glenroy, Selwyn District	Drystock
Blakiston A (1952)	Foothills – Orari, Timaru District	Drystock
Burdon R (1938)	High Country – Ashburton District	Drystock
Butler S (1863)	High Country – Ashburton District	Drystock
Clucas S (2012)	High Country – Selwyn District	Drystock
Courage S (1876)	Flats – Amberley, Hurunui District	Mixed
Deans J (1964)	Flat - Malvern, Selwyn District	Mixed
Dick B (1964)	High Country – MacKenzie District	Drystock
Dobson G (2002)	High Country –Waiau, Hurunui District	Drystock
Forrester B (2016)	Hill Country – Hurunui, Hurunui District	Drystock
Gibson J (1990)	Hill Country – Fairlie District	Drystock
Harper B (1972)	Flats – Rangitata Plains, Ashburton, District	Arable
Holm J (1992)	Hill Country – Amuri, Hurunui District	Drystock
Hosken E (1964)	High Country – MacKenzie District	Drystock
Inch R (2008)	Flats – Te Pirita, Selwyn District	Mixed
Lake Coleridge Tourism Group (2005)	Hill & High Country – Windwhistle-Lake Coleridge, Selwyn District	Drystock
Keer W & J. Keer (2000)	High Country – Waitaki District	Drystock
McLeod D (1970, 1972 & 1974)	High Country – Selwyn District	Drystock
McRae S (1968)	High Country – Hurunui District	Drystock
Menzies I (1970)	Coastal Hills – Menzies Bay, Banks Peninsula	Drystock
Morris (undated)	High Country – Ashburton District	Drystock
Porter G & T Porter (1970)	High Country – Ashburton District	Drystock
Roberts W (1946)	Coastal Hills – Motunau, Hurunui District	Mixed
Rutherford B (1970)	Foothills – Waipara, Hurunui District	Drystock
Stapleton-Smith M (1990)	Coastal Hills – Banks Peninsula	Drystock
Steele A (1974)	Hill Country – Cheviot, Hurunui District	Drystock
Woodhouse A(1982)	Hill Country – St Andrews, Timaru District	Arable/Drystock
Wright C (1992)	Flat – Annat, Selwyn District	Arable

Other Farming Narratives		
Adams (1853)	Flats & Coastal Hills , ChCh & Banks Peninsula	Observer
Fernyhough C & L Callan (2007)	High Country – Selwyn District	New farmer
Hodgkinson (1856)	Flats - Christchurch	Observer
Newton P (1973)	Hill & High Country - Canterbury	Musterer
Women's Division of NZ Farmer's Union (1939)	Various – New Zealand	Stories of various farmers - Mixed

Appendix Two: **Participants' Engagement Letter**

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Research Participants Information Sheet

Department: Geography
Telephone: +64 3 366 7001 Extn 7912
Email: Lyndamarion.weastell@pg.canterbury.ac.nz

[Date] 01 October 2014

Exploring Traditional Environmental Knowledge Among Farmers in Canterbury

Information Sheet for research participants

Introduction

My name is Lynda Weastell Murchison and I am studying for a PhD in Geography at the University of Canterbury. This information sheet explains my research proposal, what is required of participants, and how people's privacy and rights will be protected if they participate in my research.

I farm a sheep and beef farm in Canterbury and I am currently the provincial president of North Canterbury Federated Farmers. I have also worked in environmental policy and planning for 19 years. I am currently lecturing a course at the University in environmental management as well as undertaking my PhD study.

Purpose of the Research

The purpose of my research is to investigate the understandings and practices among farmers about managing land and the environment which are developed through years of observation and experience working on the land; and how this knowledge may be used to improve the way we manage pests, conservation values and other effects of farming.

Participation in Research

Your involvement in this project will be to tell me your stories about how you have managed pests, managed and developed the land, and any areas with conservation values on your farm(s). You can discuss any or all of these topics. There is also an opportunity to discuss how you would manage these things if we could throw away the current rules and processes.

The research method I am using is called narrative analysis – you tell me the story rather than answering a set of questions. This means you can tell me as much or as little as you prefer.

Time Commitment
The time the interview will take depends on how much time you wish to spend and how much you have to say. I would suggest allowing 2-3 hours.

Access to Information
The stories you tell me along with any photographs or other information is **confidential and anonymous.** No one will be able to identify you or your property from this research unless you give specific permission in writing for that to occur. The information that you tell me will be used by me only. It cannot be accessed by any council or other party and is not public information.

If you agree, our interviews will be audio-taped to help me remember the details. If you are uncomfortable doing that I will take a few notes. You will have the opportunity to read the notes or the transcript of your interview if you wish. I will also contact you to see if you would like a copy of the project results at the conclusion of the project.

Further Involvement
As a follow-up to the initial interview you may be asked if you would like to discuss further alternative approaches for managing pests, conservation values or other issues on-farm than the current council rules.

Risks in Participating in the Research
In partaking in this research there is very little risk to you.

- You determine the information you want to tell.
- The information you give is confidential and anonymous and cannot be accessed or used by councils or other groups.

Anonymity & Confidentiality of Information
To ensure anonymity and confidentiality people's names and the names of properties will not be used. If you agree to participate in this research you will be given a research identification number. This number will be used to label all information you give, including your audio-taped interview or notes and any other data you supply.

I will retain a master list of participant's names so that I can contact anyone if I need to clarify information and to remove information should someone wish to withdraw. That list and any audio-tapes or notes of interviews will be kept in a locked cabinet. The transcripts will be stored electronically and backed up on the University of Canterbury's server. Electronic data will be protected using a secure password. The data will be kept for 10 years, which is a university requirement for a PhD.

The research results will be presented either in aggregate form or as anonymous responses so no one will be able to identify a person or their property. If it is desirable for research purposes to identify a particular farm or farmer this will only happen with their express, written permission.

Right to Withdraw
Participation is voluntary and you have the right to withdraw at any stage without penalty. If you withdraw, I will remove your information from the data sets up until 01 December 2015 or later if all research is not concluded by that date.

Results of the Research

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your identity will not be made public without your prior consent. A thesis is a public document and will be available through the UC Library.

University of Canterbury Approval

The project is being carried out as a requirement for a PhD in Geography by Lynda Weastell under the supervision of Professor Eric Pawson who can be contacted at eric.pawson@canterbury.ac.nz. He will be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

Next Steps

If you agree to participate in the study, you are asked to complete the consent form and return to Lyndamarion.weastell@pg.canterbury.ac.nz.

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Research Consent Form

Department: Geography
Telephone: +64 3 366 7001 Extn 7912
Email: Lyndamarion.weastell@pg.canterbury.ac.nz
[Date] 01 October 2014

Exploring Traditional Environmental Knowledge Among Farmers in Canterbury

Consent Form for _____

(insert name)

I have been given a full explanation of this project and have had the opportunity to ask questions.
I understand what is required of me if I agree to take part in the research.

I understand that participation is voluntary and I may withdraw at any time without penalty.
Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable.

I understand that any information or opinions I provide will be kept confidential to the researcher and that any published or reported results will not identify the participants unless I have given express written permission to do so on the form below.

I understand that a thesis is a public document and will be available through the UC Library. I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed after five years.

I understand the risks associated with taking part and how they will be managed. I understand that I am able to receive a report on the findings of the study by contacting the researcher at the conclusion of the project.

I understand that I can contact the researcher Lynda Weastell at Lyndamarion.weastell@pg.canterbury.ac.nz or her supervisor Professor Eric Pawson at Eric.pawson@canterbury.ac.nz for further information.

If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz)
By signing below, I agree to participate in this research project.

_____ _____

(Signature) *(Date)*

Consent to Record Information

I agree/do not agree to the audio-taping of my interview for the purpose of recording information.

I do/do not wish to view a transcript of my interview.

Consent to Disclose Information

I do/do not agree to the naming of my farm in this research.

I do/do not agree to the inclusion of pictures of my property in this research.

I do/do not wish to view a draft of the research results that identify my property prior to submission of this thesis.

_____ _____

(Signature) *(Date)*

Please sign and date the form and return to: Lyndamarion.weastell@pg.canterbury.ac.nz

Thank you for agreeing to participate.

Lynda Weastell

Appendix Three: Descriptors of 'Country'

Descriptor	Meaning	Reference
Arable or Cropping Country	Soil types and topography to support arable crops	Newton (1973)
Back Country	Alpine hill country or the back of a large property	Dominy (2001), F02, F38, F47
Bleak Country	Cold climate.	Porter & Porter (1970)
Broken Country	Steeper hill country, tussock covered but has rock promontories 'breaking' the surface	F02, F30, F41, Clucas (2012)
Clean Country	Tussock covered hill sides with little scrub or bush	F07, F16, F47,
Dark Country	Colder, shadier hillsides	F38, F51
Developed Country	Land that has been cultivated and had exotic grass species sown, usually subdivided into smaller paddocks or blocks	F16
Difficult Country	Country that is difficult to muster due to topography making it hard to access and get good lines of sight and trails for sheep and shepherds.	F02, F41, F52
Discable Country	Land able to be worked to grow fodder crops, plant improved pasture	Newton (1973)
Downy Country	Rolling hills and downs, usually cultivatable for improved pasture or fodder crops.	F13, Rutherford (1970)
Early Country	Land facing east & north and gets early spring pasture growth, so lambs fatten sooner.	F01, Stapleton-Smith (1990)
Easy Country	Rolling country to medium hill that is 'easy' to access & muster	F02, F12, F13, F39, F50, F51
Fattening Country	Land that has climate & soil properties that support vegetation to enable young livestock to grow out or older livestock to gain weight.	F01, F04
Finishing Country	Land that has climate & soil properties to allow young livestock to gain sufficient weight for slaughter.	F39, F40
Fragile Country	Country that is prone to wind or freeze-thaw erosion – soils are light and friable and vegetation cover may be minimal.	F41, F31
Front Country	Land in the foothills or front ranges, or the homestead end of a large property.	F41. F42, Rutherford (1970)
Glacier Country	Land that has been shaped by the advance and retreat of glaciers.	F50, McLeod (1972) (Porter & Porter (1970)
Hard Country	Steeper, drier slopes which are not vey fertile and possibly mineral deficient, livestock tend not to do so well.	F02, F38, F50, F51
Harsh Country	Synonym for hard country.	Newton (1973)
Healthy Stock Country	Land that has aspect, soil types & climate that support healthy livestock – usually free-draining, relatively warm, dry winters.	F06, F16
Heavy Country	Soils are heavy, usually with clay base.	F04, F43, F49
High Country	Land at altitude	F02, F16, F38, F41, F42, F47, F51, F52
Hungry Country	Poorer soils that require substantial fertiliser for good grass growth. Hungry country is not necessarily sour	F02, F52.
'In the Raw'	Tussockland, scrubland or bushland that has not been cleared or modified for farming.	Newton (1973)
Kind Country	Land well-suited to livestock	F51, Newton (1973)
Late Country	Land is colder and slower to establish spring growth	F08, F47
Light Country	Land with lighter, free-draining soils and usually drought prone.	F02, F07, F22

Limestone Country	Country that is formed from limestone base – usually associated with good sheep country.	F12, F03
Merino Country	Country that is only suited for Merino sheep due to being very steep, cold and/or dry, any of which limits vegetation growth.	F41, F50, F51
Native Country	Tussock land or scrubland which may have been oversown with exotic species but has not been sprayed or cleared and sown in improved pasture or crops.	F50, F52. F53
Rugged Country	Steep country with scrubland and bush	F42
Run Country	Tussocklands that are grazable and have some minimal fencing but do not have cultivated pastures, shelter belts, or infrastructure and only limited fencing.	F07, F16, F53, Keer & Keer (2000), Menzies (1970)
Running Shingle	Base layer of free-draining shingle or riverbed under topsoil	F09, F15
Safe Country	Country that is not snow prone.	F02, Woodhouse (1982)
Scree Country/Shingle Slide	Shingle, scree slopes with little or no vegetation and which are prone to movement when mustered.	F02, F41, Clucas (2012), Newton (1973)
Sheep Country	Land suited to sheep farming, usually denoted by soil type and climate: lighter, free-draining soils – ideally slightly alkaline, cooler, drier winters.	F02, F07, F47, F51
Slumpy Country or Under-runners	Clay-based soils on slopes that are subject to under-running or movement.	F03, F07, F30, F53
Steep Country	Steep hill country, that is still covered in tussock or vegetation.	F41
Store Country	Land that is too cold and the soils are too poor to enable young livestock to fatten for slaughter.	F02, F41, F47, F51
Sour Country	Country with acidic soils, usually visible in a yellowing of grass species.	F02, F04, F42
Summer Country	Steeper, colder, snow-prone land that is suitable for grazing in summer only.	F02, F41
Sweet Country	Land with limestone base and slightly alkaline soils.	F02, F28, Forrester (2016)
Tarry Ground	Heavy clay base soils or peat bogs where livestock can bet bogged in the wet.	F27, Newton (1973)
Tiger Country	Regenerating bush or scrub that is hard for stock and shepherds to access (like a jungle).	Newton (1973)
Tops/High Tops	Land above the snow line.	F02, F16, F27, F38, F41, F47, Clucas (2012), Newton (1973)
Tough Country	Land that is hard to graze or farm with success - tough on livestock and famer, due to having several limiting characteristic(s) such as topography, soil, climate.	F08, F42, Menzies (1970), Newton (1973)
Tussock Country	Country still covered predominantly in tussock but may have English grasses oversown.	F25
Undeveloped Country	Synonym for 'in the raw.'	Newton (1973)
Walking Country	Country to steep to muster on horseback.	Newton (1973), Keer & Keer (2000)
Whether Country	Land suitable only for running wethers as soil is poor & vegetation cover largely unimproved	F02, Newton (1973)
Winter Country	Country that is suitable for grazing stock in winter time because it is warmer and less snow prone.	F02, F16, F41, F42

Appendix Four: **Narratives about Soils**

Narrative	Description or Quote
F03L33	"Two main types – Waikari limestone and that's a Melanic soil – I remember the word; a heavy limestone soil and subject to a lot of ability to expand and contract … The other soil type is an Onepunga silt loam – a light sandy based soil that dries out quicker but it also warms s up a lot quicker…"
F04A33	"Clay soils, very wet soils and spring holes….When you develop it of course you have got to build it up with lime…Lime releases all the trace elements.. Then we were sulphur short at one stage… Then we had a Selenium deficiency…"
F11M43	"The soil type is what has always been called in this area a Templeton silt loam, which is a good medium cropping soil and it has some stony phases to it in part of the farm…in the last series of soil maps they've change all the name of soils around here, I think the new name is a Darnley which means very little to anyone around here but everyone knows what a Templeton is."
F12L23	"We've got a Rendzina for the most part, so our natural fertility is reasonably high …just over 1/2 not quite 2/3 of the property has phosphate available. Our pH ranges from 5.7 and we try to keep everything above that, to 7.5 on the tops…which is largely rock country – Onepunga or may be Huihui – I'd have to look that one up."
F15M23	"This farm is very diverse in soil types. I can tell you a story about the history of every paddock; I can tell you which ones are half wet and half dry."
F16L42	"The soil type of 1/3 of the farm has a clay subsoil and it has pockets of very fertile peat ground…another 1/3 is hard, dry shingle territory and it dries out rapidly in summer… up the farm block it can be wet and cold and nasty. We've got lots of shingle and lots of boulders because of course the river [Rakaia] came through. The soils are perfectly usable- we've just got to keep nurturing them."
F18A23	"Very good soils, a wee bit variable but really free soils, though the other side of Southbridge has very heavy soils, Tai Tapu and Temuka."
F21L23	"Oh well, they're quite heavy clay soils, especially out the front they are really heavy. A wee bit of lighter stuff towards Jury's Rd but they are still clay based. A lot of the farm is sunny, suppose half-in-half facing nor-west and south-east."
F22A23	"It's a Tai Tapu and Wakanui soil so we can grow pretty good crops…we dry out a bit in summer, but we don't need a lot of water…the climate here they say in growth days is about five days behind Blenheim because we don't get the easterly wind. We don't get the leaching either because we've got top soils and then we go down into clays and then a marine layer. We could be growing vegetables it is country that will grow crop, it's naturally fertile."
F27L43	"If you believe people, this is the Chertsey stone loams and this is a Hororata stony loam and this pocket through here…this is very heavy clay, they call it Coopers creek clay and it's got peat. It's about six inches of topsoil on clay so …you work the paddocks in you struggle to find a stone so it's the stuff that is very wet in winter…it's a little annoying when you are looking at all these people making decisions as to how your soil leaches nitrogen when the wet doesn't go through clay. The S map doesn't have us with Coopers Creek clay, when we were doing a wetland study a few years ago they were adamant we had Coopers Creek clay, but S-map says we are all stony loam. Well when you have 100ha that is not stony loam, that makes a big difference."
F30M23	"I got a bit disillusioned with the whole fertiliser industry…they are just a bunch of salesmen trying to sell us what they are trying to produce, so that led us to look at the soils….the soil is such a complex system and to just treat it as a medium to hold chemicals you chuck on top of it doesn't make sense when you look at the biological aspects of it: biology, chemistry…again it is all connected…the two things that make the biggest difference on our country are lime and biological activity…If the soil is healthy you will grow healthy animals and if you have healthy animals you will spend a lot less time looking after them."
F34L23	"It varies a bit, quite heavy peaty soils out on the flats, there's 800 of hectares of that. The rest of it is quite hard sort of Waimak, the soils are not very deep on the other side so ..we can't develop too much. Over this sites aits a bit deeper more Hurunui-type soils but just tussock means we burn and oversow…The flats are about a 6 pH and back in the hill struggling at 5 and that's because of the wetness and the pH of those peatier soils, you've got to keep the lime up to them."

F36D23/1	"I still remember coming down here and I had never seen rocks like it...coming off a swamp and…I said are you sure you can grow grass down here?...but after 10 years here it's fine…we weren't putting enough [nitrogen] on in the early years …so we've got irrigation and nitrogen and we've started to grow more grass."
F37M33	"I think I have 4 or 5 soil types but I can only tell you in the old nomenclature, I have a Motukarara sandy silt loam, we've got a Templeton sandy silt loam which is a good cropping soils… when we did our farm plan we had 23 [laughter], I can't see the difference between [all 23 of] them…"
F39A23	"Deep Templeton loam soils and if you find a stone in a paddock you put it in your pocket before it has a baby. Very easy, flat high porous soils, great soils…"
F41H13	"I forget the classifications, Kaikoura yellow-brown earths and Mesopotamia yellow-brown earths and quite a few Tasman soils, which is just river bed. We've got about 80-90ha so reasonable depth soil, good paddocks, a cultivated ground…around 20ha on much bonier lighter soil but still reasonable …all the hills in a good cover of high country yellow-brown earths, so …fairly productive soils really considering where we are."
F42H23	"Getting better, they range from 4.5 not to about 4.8 [pH]. Ours are all Tekoa. I think ours are still called Tekoa…the place next to us was a double syncline so its seabed but ours is not…I know which ones have got a claypan and how deep the pan is…"
F43A23	"ECan has changed all the soil types on us, so I am going to use the old ones [names]…so we have Temuka silt loams on our heavier ground and lighter blocks are Paparoa fine sandy loam…so we have a nice balance of heavier ground as well as some loamier stuff… The policy is as little cultivation as possible...sometimes we plough ..we are trying to make sure we have cover crops over the soil in winter to protect it.. there are a number of techniques we use ..they are all about protecting soil structure...if you have alate harvest like we did this year we simply don't have the timeframes to get that [stubble] to break down and get a seed bed...so in those scenarios the option of burning is quite clearly the right one… I think burning it still a key tool but making sure we are not using it more often than we need to."
F46D23/1	"On the main dairy farm we have got very good soils, I think there are some Hadfields soils and some Templetons. This place [run-off block] has similar soils…there are a couple of variations on the finger of the farm but generally its quite even."
F48A22	"We've got Pahau soils, so they have impeded drainage and we have quite a high clay content. Immediately across the road…is straight clay downs and the clay runs out as you go this [point] way…and it's not suited to root cropping like onions or spuds…The Bennetts Block is light …[and] we have about 80ha of peat swamp, it's like potting mix, just beautiful soil…. What is the other major resource we have, is soil and yet ECan ignores it…We have dairy farmers all over Canterbury on free soils putting stones in pivot track which is basically saying we don't care what land use someone wants to put that land to we are going to stuff it now. It should be completely illegal to do that. You are not allowed to pollute the air and the water, yet you are allowed to pollute the soil… We are stupid what we do in this country, just stupid."
F49A23	"Darnley Pahau is the new listing, it used to be Templeton shallow which is basically 200mm of soil on very heavy clay, or very light running shingle. The shingle ridges run throughout the farm on an angel about 200m apart...and the soil type soaks up moisture very, very easily and then ponds very easily because it sit son tight clay so you have to be careful not to over water….I have drawn up the soil map son my farm, I have gone to the traditional [LUC] maps and…have pinpointed where all the shingle ridges are…the S-maps are just too broad, it's like using a spray can to mark out a pencil line. We test all our paddocks, we've got about 40 paddocks and we test every paddocks every 4-5 years, so I know the pH, P, Mg, S, so we have a good idea what each crop is going to need. I would rather forgo making money…that to have our soil damaged and long-term issues with our soil."
McLeod	"Once soil is bared from its protective cover it is very vulnerable to wind erosion and at Mesopotamia the rabbits had broken the ground with their scratching and burrowing and the remnant tussock was soon over-whelmed by the wind-blown soil" (1970, p.185)._
Stapleton-Smith	"Signs of the mighty subterranean volcanic forces which had up-thrust the whole of the Peninsula were visible everywhere, though deeply overlaid by the windblown loess that followed. For this yellowy clay is wildly unstable =, and it had washed off steeper slopes…over the loess is a thin layer of dark topsoil, which is quite productive,. Bu tit is the clay which can turn from yellow flour to yellow treacle after a days' hard rain which poses problems for farmer and gardener alike" (1990, p.99).

Appendix Five: **Economic Factors in Farming**

Narrative	Description or Quote
	Drystock Participants
F02H23	"No, it [profitability] is in the back of my mind. Depends whether you need to borrow money which requires you to do some sums."
F03L33	"I do a budget. I keep a cashflow book – I do it manually and Bruce will do it on the internet…other farmers may not bother with that sort of record keeping…dairy farmers might because they are more cut and dried than traditional farming."
F06L43	'I've never made a loss on the farm….we make enough at the moment….Dollars are way down the list for us, lifestyle is more important, family is more important."
F10L33	"The other thing about sheep is that you cannot build up high costs and run sheep on it. The returns aren't there. That is why people have to have dairy, it is the most profitable way to keep the water up."
F12L23	"Making money and being anti-environment are not the same thing. You can make more money and be environmentally friendly, with just good practice."
F16L42	"To me it is all profit, profit, profit [today], which you have to do, but it is removing the view, philosophically and morally, am I looking after the land?"
F21L23	"I suppose it's to try and grow the farm and protect our assets and keep us not sitting still but going ahead. You have to be cost focused, but the banks say don't skimp on your fertiliser in these dry years, but I have skimped a bit in this last year. I wish I could spend more time looking at how we could improve the profitability of our farm and I think we could still do more with marketing our products in this district."
F30L23	"The best return is lamb finishing by a long way, but sheep seem to be out of favour and not very trendy but if you work it out for return on capital it will be every bit as good as dairy. The farmers…in our discussion group…are always about profitability per hectare or per dry matter production, but the [agri-business] industry does love pushing it, that's how they sell stuff…."
F38H33	"My father said …we are not going to extend ourselves financially so whatever we spent on deer...we had to make sure we recovered that annually…and that was good because when the arse did fall out of deer …we saw several places go bust…so that was my father's conservatism and now I am finding I am going the same with my sons."
F41H13	"Traditional extensive grazing has become uneconomic so the only way we can survive has been agricultural intensification and the only economic use of the very extensive country has become safari park hunting…but people who think tourism is the saviour of this country have got their heads buried somewhere stupid…I'm not a huge fan of the dairy industry but …the average dairy employee is on $60kand the average tourism employee is on the minimum wage… and if you are a landholder you've got to make money off the land…So a lot of changes that a large number of the community don't like…most of those changes you've got to do to survive or you will end up selling your property and the purchaser…they'll be doing it a lot harder and faster than what you were considering."
F42H23	"I went to the bank...got 400 [hives] and a book on beekeeping…that turned out to create enough cashflow with the walking track to buy the farm…we have bought the farm and now we are trying to build the rich business to go with it…"
F47L43	"Some people have made a lot of money trading farms. They have no attachment they just see it as property that can be traded. That not my approach to it, I'd be happy if I was worth half as much and made twice the income…I think you go through that era in your life when you are really trying to push yourself ahead…and then when you get to our age you start to come back and…the word sustainability starts to take over…I get more enjoyment out of making the place run better than produce more...but it is amazing how if you push it too hard you get to that point where the last dollar has cost you 90c to earn 5c."
McLeod	"I have not ignored the economic limitations of high country run-holding in this book but tried to portray the compensation which life among such magnificent surroundings provides, and the deep gratitude I feel towards fate, destiny or Divine intervention which enabled me to stride the mountain tops…"(1974, p.12).

	Arable & Mixed (Drystock) Participants
F15M23	"I am probably at the stage now where I can see the farm is paying and there is a bit of an end to the continuous overdraft... The first thing is to break even…I am past that point now…I don't do budgets, well I do them in my head… I focus more on how the farm operation fits together. If I get it right the finance looks after itself…when you decide what you are going to do, you have to work out whether it is going to stack up financially."
F26M42	"Those were hard days, the Roger Douglas days…we had just bought this farm…it was worth half what we paid for it in 3 years…we paid 23% interest. Kids today have no idea…"
F09A23	"The brain says go that way [dairy] but the heart isn't in it."
F18A23	"We do what makes money , we try to do things really well and probably born from the 1980s because you had to be frugal, so while I'm not stingy …I don't like to waste money …and you try to grow really good crops. We grow staples…and vegetables seeds…they are the high risk block, and the wheat is the low risk block and the ryegrass and clover seed are the mid risk block and then you have process crops to fill in the gaps."
F22A23	"My father when through the Depression and we are not a big, big farm so you've got to keep things under control a bit. I suppose we should have bought more land but I am a farmer not a land speculator…this farm has always made a profit, even in the downturns…so that's what I try to do .It's no use having all this stuff and going broke."
F33A23	"I've been very conservative. I've borrowed very little from the bank and I've had a family mortgage…I've done my developments through farm profits …I've got virtually zilch debt...I am not forced to intensify like everyone else is."
F39A23	"We are receiving the same price for our grain as farmers were 30 years ago …and it's getting to the point where we can't sell it below the cost of production."
F39A23	"We felt the banks had got on this band wagon of dairy conversions and they were blinded by the amount of business they could make out of that money, they lost sight of the farming side of it…so it was a fairly determined effort on our part to stay arable and make it work..."
F40A23	"Dad's second cousin…they lost the whole bloody thing…That could have just as easily been us, so you've got to keep your head down and try to make it work…We are being conservative with our debt, it's about hanging on. It might be worth $20m, so what if it's not for sale?"
F43A23	"[Seed production] has certainly helped cash flow and net returns for arable farming…[but] each year it is different what buyers want. So when you are growing all these crops…that may be the perfect place in the rotation for it but.. the market might be flooded, or the price is so low it isn't worth planting. So you have to have flexibility…These places producing huge outputs, it's costing them a fortune to do it. For me it's the bit in the middle that counts because that's the bit where sustainability comes in the net [income]…not the gross."
F45A33	"There may be times when you are lucky and you strike something that makes you a lot of money and there will be times when you just do the basics really well and it will make you more money than the guys who are a bit more flashy and in the media… We just sometimes make more money that sheep farmers, occasionally but not very often."
F48A22	"The principles are the same no matter what the farm, it's no different from business: its volume x margin-costs…it's just how you apply those principles… I'm a 90% person, I'm not much good at the last 10%...so I will never get the absolute peak yields…or if I do it will be by accident not design but I take a much more commercial approach [than some farmers]…I think one of the nice things about sheep and beef farming is that it is not as competitive…modern arable is competitive, but it matter whether you talk traditional arable, dairy or sheep and beef they are in a different category to the modern farmer who is mortgaged up to the hilt. You cannot be totally lifestyle if you have got a big mortgage."
F49A23	"We have been traditional wheat growers ..I even managed to get it up to an average of 9 Tonnes [per hectare] and we are not making any money…so after all this time [5 generations] I've decided to quit and I really like growing wheat but…the margins are too tight…"I never intended to be super rich and make heaps of money and go buy all the neighbours but I always wanted to make enough money to be able to do what we needed to do here and we just can't…"

	Dairy & Mixed (Dairy & Sheep)
F11M43	"We aren't making any more land, so I guess the only way you stay viable is to go more intensive, and that's part of the challenge we face. Cost wise there is no comparison [between arable and dairy]…we cut our diesel bill to 1/3 of what it used to be, stopped wearing out a tractor every 5 years…so the economics of it [dairy] was just brilliant not to mention the environmental benefits of not having all that diesel, all that carbon going into the atmosphere."
F31M43	"We've got an effluent consent for 1000 cows…we had four banks chasing us …and two banks said yes and two said no …and we thought if two banks are telling us no then we are going to be way too highly geared…What we had really wanted from a dairy farm was the ability to close the gates. So when the pay-out turns crap we shut the gates, no need to buy anything…and a 1000 cow operation wasn't going to do that, we'd have to winter off…so we went back to a real minimal operation...so that's milking 600 cows in a herringbone shed, a much simpler structure… and have some sheep out on the hill…"
F14D22/1	"It's got to be profitable…capital gain is important…I'd prefer to be working in the industry without capital gain, but it is a big bonus in the dairy industry. I'm not frightened to borrow at 5% if I can make 1% on it... I'll lift its value and turn it into a dairy farm value at $54k/ha rather than $34k/ha for irrigable land or $17k/ha for dry land. That is w here we will make our profit."
F19D33	"I try to concentrate on profit per hectare because that's your limiting resource – the number of hectares you have, not the number of cows. Environment is a big thing…I'm not really a money person... When I go out to work I want it to be nice, but it's got to be economic too, the environment things cost a lot."
F20D22	"You hear about doing good work plans and things, but no one is coming up with a KPI – KPIs for milk solids, KPIs for calving etc, they are easy to come up with. The one that are hard are the intangibles…like how tidy the farm is, how many thistles there are…"
F23D23/1	"We are trying to reduce inputs into the farm…it is a response to the economic situation and milk prices are down, you have to consider how much extra supplement you are putting in. With the pay-out dropping to $4.60 last year and $4 or $3.60 or whatever it is going to be, it isn't economic to feed supplements in the autumn….There are going to be environmental positives that come out of decisions people have made for financial reasons."
F24D23/1	"It's control of both the costs and the outcomes, I guess. So in a lot of decisions I guess one size of their brains is saying dollars. Dollars v control and you reach an equilibrium you're happy with. Perhaps some of the young ones who are just getting started and haven't got any fat in their balance sheets do it one way …..We like to perform above average if we can and return some of our profits back into the farm. It is good to be able to reinvest into the farm to improve the working environment, the physical environment and the aesthetics …."
F32D13/1	"[I am] 100% financed …if we see anything coming that might knock farm values back 10-15%, that's all my equity gone…I'm trying to create something I am quite proud of…not making decisions purely on economics, but you need financial means to be able to do that…if there's an option that's reasonably economic and the right thing to do, then I am the sort of farmer who'd do that, but there's that limit because of my economic situation and I think most young farmers and share-milkers would be in the same place….There are a lot of sheep and beef guys not farming purely for profit, there's a lot of lifestyle factors involved…so to do a comparison just on profitability …might be quite unfair."
F35D12/1	"My view is that if you want to inherit Dad's farm tomorrow you can't work on Dad's farm today, which is a shame because that's where the legacy stuff is, but you need an off-farm income."
F36D23/1	"It's a production system...if you do everything technically correct you are going to go broke…marginal cost and marginal revenue…perfection can create complexity and complexity means staff can't carry out the vision. I have always lacked the money to do things 100% technically…I suppose I have spent a lot of time on technology for the sustainability of people."
F46D23/1	"When you are farming it is about money because you have to make money to be able to farm, but it's not all about money."